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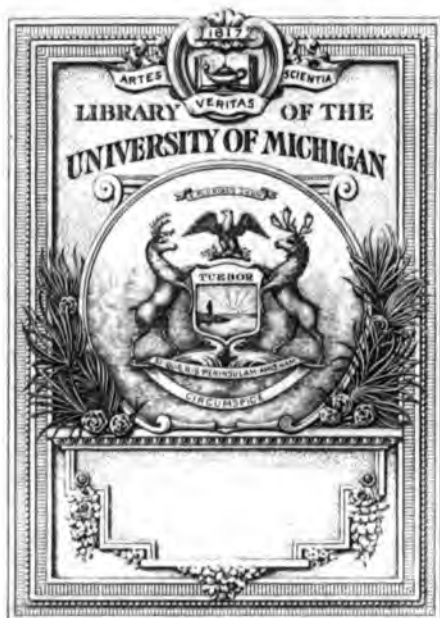
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*U. S. Navy Dept.*

**REPORT**

OF THE

**SECRETARY OF THE NAVY;**

BEING PART OF

**THE MESSAGE AND DOCUMENTS**

COMMUNICATED TO THE

**TWO HOUSES OF CONGRESS**

AT THE

**BEGINNING OF THE SECOND SESSION OF THE FIFTY-SECOND CONGRESS.**

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**WASHINGTON:**

**GOVERNMENT PRINTING OFFICE.**

**1892.**

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See vol. 6  
1-6-1892

# REPORT OF THE SECRETARY OF THE NAVY.

NAVY DEPARTMENT,  
*December 10, 1892.*

*To the President:*

On the 4th of March, 1889, the fleet of the United States Navy, apart from a few old ships long since obsolete and fast going to decay, consisted of three modern steel vessels, of an aggregate tonnage of 7,863 tons, and mounting thirteen 6-inch and four 8-inch guns, the forgings for which last had been purchased from abroad, as they could not be made in this country. These vessels were the following:

Name of vessel.	Displacement.	Commissioned.
	<i>Tons.</i>	
Dolphin .....	1,485	Dec. 8, 1885
Atlanta .....	3,189	July 19, 1886
Boston .....	3,189	May 2, 1887

During your administration the following vessels will have been added to the Navy:

Name of vessel.	Displacement.	Commissioned.
	<i>Tons.</i>	
Chicago .....	4,500	Apr. 17, 1889
Yorktown .....	1,700	Apr. 23, 1889
Petrel .....	890	Dec. 10, 1889
Charleston .....	4,040	Dec. 26, 1889
nore .....	4,600	Jan. 7, 1890
thing .....	116	Apr. 22, 1890
avins .....	930	June 7, 1890
lelphia .....	4,324	July 28, 1890
francisco .....	4,083	Nov. 15, 1890
ark .....	4,083	Feb. 2, 1891
rd .....	1,700	Feb. 14, 1891
ington .....	1,700	June 20, 1891
nomoh .....	3,990	Oct. 27, 1891
oft .....	838	Dec. 20, 1892
l .....	1,050	Jan. 10, 1893
n .....	4,138	Jan. 10, 1893
k .....	8,150	Jan. 31, 1893
.....	2,000	Jan. 31, 1893
sy .....	2,000	Feb. 28, 1893

This makes a total of nineteen vessels of the new Navy put in commission during this administration, of an aggregate tonnage of 54,832 tons; mounting altogether two 12-inch, six 10-inch, sixteen 8-inch, and eighty-two 6-inch guns, all of which, with the exception of five of the earliest, have been manufactured in this country. Three new steel tugs have also been constructed and put in service during this period.

There are also under construction the following vessels, on which rapid progress is being made:

Name of vessel.	Displacement.	Name of vessel.	Displacement.
	<i>Tons.</i>		<i>Tons.</i>
Oregon .....	10,200	Amphitrite .....	3,990
Indiana .....	10,200	Monadnock .....	3,990
Massachusetts .....	10,200	Terror .....	3,990
Columbia .....	7,350	Cincinnati .....	3,183
Minneapolis .....	7,350	Raleigh .....	3,183
Maine .....	6,648	Ram .....	2,183
Texas .....	6,300	Marblehead .....	2,000
Puritan .....	6,060	Castine .....	1,050
Olympia .....	5,500	Torpedo Boat No. 2 .....	120

Making eighteen vessels in process of construction and certain to be completed, should their armor be delivered, within the next year, of an aggregate tonnage of 93,497 tons, and mounting altogether twelve 13-inch, six 12-inch, sixteen 10-inch, thirty 8-inch, thirty-two 6-inch, thirty-eight 5-inch and thirty-four 4-inch guns, all of which have been or are to be manufactured in this country.

During this period twenty-five vessels will have been launched, thirteen of them, including the three tugs, during the current year, and of all the new ships the construction of which has been begun during the present administration only two will remain on the stocks on the 4th of March next.

For the two new vessels authorized at the last session of Congress advertisements were issued September 28, inviting proposals, as follows:

Name of vessel.	Displacement.
	<i>Tons.</i>
Iowa .....	11,206
Brooklyn .....	9,150

Our new Navy, including all vessels built or authorized, now consists of the following vessels:

One seagoing battle ship (first class): *Iowa*.

Three coast-line battle ships (first class): *Massachusetts*, *Indiana*, *Oregon*.

Two battle ships (second class): *Maine*, *Texas*.

Six double-turretted harbor-defense vessels: *Puritan*, *Monterey*, *Antonomoh*, *Monadnock*, *Terror*, *Amphitrite*.

Two armored cruisers: *New York*, *Brooklyn*.

One ram.

Two protected cruisers of extreme speed: *Columbia*, *Minneapolis*.

Fourteen cruisers: *Olympia*, *Baltimore*, *Chicago*, *Philadelphia*, *San Francisco*, *Newark*, *Charleston*, *Boston*, *Atlanta*, *Cincinnati*, *Raleigh*, *Detroit*, *Montgomery*, *Marblehead*.

One dispatch vessel: *Dolphin*.

Six gunboats: *Yorktown*, *Concord*, *Bennington*, *Machias*, *Castine*, *Petrel*.

One dynamite vessel: *Vesuvius*.

One practice vessel: *Bancroft*.

Two torpedo boats: *Cushing*, No. 2.

Making a total of 42 vessels.

The following table shows the proportion in which the labor of reconstructing the Navy has been distributed among the three administrations that have participated therein:

	New vessels authorized.	New vessels begun.	Vessels com- missioned.	Tonnage upon which work has ac- tually been done.
March 4—	Tons.	Tons.	Tons.	Tons.
1881-1885.....	23, 076	12, 363	.....	12, 363
1885-1889.....	67, 183	34, 814	7, 863	69, 197
1889-1893.....	66, 616	108, 018	54, 832	109, 564

While the authorization of new ships rests wholly with Congress, the recommendations of the Department have a large influence on the result. It will be seen from the above table that about 23,000 tons were authorized under the first administration that took up the work of naval reconstruction, and that this amount was nearly trebled under each of the two succeeding administrations. The authorizations during the first period included 5 cruisers and 3 gunboats. In the second period, 2 battle ships of the second class, 1 armored cruiser, 1 armored harbor-defense ship, 9 cruisers, 4 gunboats, 1 practice vessel, 1 ram, 1 dynamite-gun vessel, 1 torpedo boat, and 3 tugs. In the third they have comprised 4 first-class battle ships, 1 armored cruiser, 2 protected cruisers of extreme speed, 1 torpedo cruiser, and 1 torpedo boat. All the above, with perhaps one or two exceptions, are essentialponents of a fully developed naval force, but the relative contribution to the defensive power of the United States to be found in these 1 of vessels is not to be measured either by the number of ships or number of tons alone.

reconstruction of the Navy has imposed upon the Navy Department additional burden of labor and responsibility, far beyond



that which was demanded of it before the reconstruction began. Of the share of this labor and responsibility that has fallen to the present administration, the above figures speak for themselves.

The development of the past four years has not been confined to ships alone. At the beginning of this administration the naval establishment was entirely destitute of certain elements of efficiency, each one of which was indispensable to its practical employment as a fighting force, and the absence of which, if it had been possessed of a hundred ships, would still have left it in a condition of paralysis.

These were the following: Armor, torpedoes, heavy rapid-fire guns, armor-piercing shells, smokeless powder, high explosives.

(1) *Armor*.—In March, 1889, the Navy was still without armor, although a contract made two years before provided for a future supply. This armor was to be of simple steel. A contract for a like amount was made with another firm in 1890, and led to the erection of a second plant. Both plants are now furnishing material. In the meantime a series of exhaustive experiments, lasting over three years, resulted in the development of an armor of new composition and treated by a new process, far superior to any hitherto known, and destined to furnish the standard both of quality and manufacture for the great naval powers of Europe.

(2) *Torpedoes*.—In 1889 the Navy had several ships in process of construction that were designed and fitted for torpedoes, but it had no torpedoes that could be used from the ships, nor was there any concern that could make them in this country. Since that date the manufacture of the Whitehead torpedo, the most efficient known, has been domesticated, and a contract has been made for 100 18-inch torpedoes of the most recent type. Several of these have been completed and are now undergoing adjustment trials; the remainder will be ready for service in a short time.

(3) *Heavy rapid-fire guns*.—In 1889 the Navy had no heavy rapid-fire guns. Since that time these guns have been developed of calibers of 4, 5, and 6 inch, the success of which under trial has proved complete. The difficult problems presented in these guns, in reference to breech mechanism, metallic cartridge cases, and other essential features have been overcome, and a maximum rapidity of fire has been obtained with each caliber, all parts of the gun working perfectly.

(4) *Armor-piercing shells*.—Although the few ships that had been completed in 1889 were armed with high-power guns, we had no projectile that could make the slightest impression upon armor-plating. This species of projectile, which was exceedingly difficult to make, and had been the monopoly of one or two firms in Europe, is now turned out in abundant quantities by American manufacturers; and recent trials justify the assertion that the domestic manufacture, entered upon under the fostering care and encouragement of the Navy Department, has already surpassed the foreign product.

(5) *Smokeless powder*.—The remarkable advantages of smokeless powder, then a recent European invention, led the Department, in 1889, to undertake its development in this country. By independent investigation and experiments, conducted by its own agencies, at its own establishments, it has succeeded in developing a smokeless powder which in efficiency and endurance gives better results than any known powder abroad.

(6) *High explosives*.—In 1889 no high explosive was known in this country which gave the powerful rending effect required for naval use, and which was at the same time sufficiently safe and stable to be employed as a bursting charge in shells under ordinary conditions. Careful and protracted experiments have at last developed a high explosive that can safely be used in shells fired from high-power guns, with service powder, giving service velocities. The shells charged with the new explosive are not only uninjured by the discharge of the gun, but can be fired through armor plates and burst at will beyond them.

The progress herein noted, both in ships and in ordnance, by which the United States has emerged from its condition of helplessness at sea, and by the employment of its own resources, has distanced its more experienced competitors, marks an epoch in the naval development not only of this country but of the world.

#### PROGRESS OF RECENT CONSTRUCTION.

As was predicted in the last report, the delays in the delivery of armor have caused the dates of final completion of the armored vessels under construction to be somewhat later than was at first contemplated. The only compensation for this delay is in the superior quality of the armor that has been recently developed.

Of the ships now under construction the *Detroit*, *Montgomery*, *Machias*, and *Bancroft*, all of which were launched during the past year, will shortly have their trials and be placed in commission for service at the naval review.

The three battle ships, constituting by far the most important addition to the Navy that has yet been authorized, are making rapid progress.

The *Indiana* and *Massachusetts*, building at the works of Messrs,

W Cramp & Sons, Philadelphia, are the most advanced, and will shortly be ready for launching. Their diagonal armor has been fitted bolted in place, while the interior fittings, including the ventilation drainage systems, are keeping pace with the rest of the work. *Oregon*, building at the Union Iron Works, San Francisco, is fully fitted, with berth-deck and protective-deck beams and plating in and outside plating half completed. The vessel is being pushed, and will be ready for launching in May next.

The armored cruiser *New York*, building at Messrs. Wm. Cramp

& Sons, is on the point of completion, the principal items of work remaining being in the sponson and turret armor. Arrangements have been made with the contractors to receive the sponsons from the steel works as soon as they are pressed into shape, the final machine work to be done at the shipyard. This will greatly expedite the fitting of the armor. The conning tower has been delivered within the past month and will be immediately erected in place, thus enabling all connections to steering gear and engine room to be finally completed. The ship will be ready for her trial trip within the next three months, and will immediately be placed in commission as the flagship of the Squadron of Review.

The two protected high-speed cruisers *Columbia* and *Minneapolis* (formerly No. 12 and No. 13), building at the same yard, are advancing rapidly. The *Columbia* was launched July 26, 1892, and will be ready for trial in the early spring. The delay here, as in other cases, has been in the sponson armor; but this difficulty has been overcome, and the ship will be completed in time to take part in the review. The *Minneapolis*, which was contracted for nearly a year after her sister ship, will be launched in the course of a few months, and her progress thereafter will be smooth and rapid.

These two triple-screw cruisers, remarkable for their speed even among the most recent ocean greyhounds, and presenting a combination of this quality with endurance and offensive power unexampled in vessels of the cruiser type, whether built or building, constitute an addition to the Navy whose efficiency in their sphere of action can not be overestimated. It is a satisfaction to notice that a novel feature of these ships, the triple-screw, whose advantages were pointed out in previous reports, has been adopted by the White Star Steamship Company in the design of their new 700-foot ship the *Gigantic*, just ordered from Harland & Wolff, of Belfast, and intended to be the finest and fastest passenger steamship afloat.

The *Olympia*, a fine cruiser of 5,500 tons, building at the Union Iron Works, San Francisco, was launched on November 5, and is more than half completed. She is expected to be ready for trial in June of next year.

The *Maine* and *Texas*, armored battle ships of the second class, building respectively at the New York and Norfolk navy-yards, are now only delayed by the want of armor. During the past year the engines and boilers have been placed in the *Maine*, and the work of erection and the connection of pipes and fittings is nearly completed. The steel work of the superstructure is finished and the wooden deck laid, the armor backing is in place, and the interior fittings of the ship are nearly completed. The vessel is now in dock, and the shaft struts are being fitted in place.

The *Texas* was launched on June 28, and has made good progress since that date. She is now about 80 per cent completed, and, like her consort at New York, is only delayed by the want of armor.

During the year the *Miantonomoh* has been commissioned, and has undergone successful gun trials. The four remaining double-turreted monitors at the navy-yards, namely, the *Puritan* and *Terror*, at New York, the *Amphitrite*, at Norfolk, and the *Monadnock*, at Mare Island, are all waiting for armor. The *Terror* presents peculiar features in the application of pneumatic power to the steering gear and to the elevating and training gear of the turret guns. The installation of the pneumatic system is now well advanced, and will be completed within the next six months. In all these vessels, except the *Monadnock*, which has been delayed by the lack of suitable tools at Mare Island, a want now gradually being overcome, the backing for both barbette and side armor is in place. The date of completion depends solely on the ability of the armor contractors to fulfill their contracts.

The *Monterey*, fitting out at the Union Iron Works, San Francisco, is nearly ready for service, the cause of delay being the nondelivery of the turret armor. In other respects the vessel is finished, and her trial and commission will shortly take place.

The ram, a vessel of novel construction, building at the Bath Iron Works, upon a system devised by Rear-Admiral Ammen, will be ready for launching upon the completion of the work now in progress of adjusting the struts, shafts, and propellers, and the placing of valves. She is completed outside except her armor, and will be launched during the present month.

The *Raleigh*, now building at the Norfolk navy-yard, was launched on March 31, and the *Cincinnati*, building at the New York yard, on November 10, 1892. These vessels are cruisers of 3,000 tons, of similar design, and will make efficient vessels for their size. Their engines and boilers have been successfully built at the New York navy-yard, notwithstanding the doubts formerly entertained of the ability of a Government yard to do this class of work. Those of the *Raleigh* were shipped to Norfolk early in the summer and are now being erected on board the ship. By an unfortunate accident the engines of the *Cincinnati*, after being set up and satisfactorily tested, were so injured by fire as to necessitate the renewal of certain portions, but this work is now well in hand and will cause no great delay. Both these vessels will probably be ready before their sponson armor is delivered by the manufacturers.

The *Castine*, building at the Bath Iron Works, at Bath, Me., is slightly behind her sister ship, the *Machias*, owing to certain delays in completing her machinery, but will be ready for commission during the spring.

The work on Torpedo Boat No. 2, building at Dubuque, Iowa, is progressing satisfactorily, the vessel now being nearly two-thirds completed. She will be ready for her trial trip by June 1, 1893.

In connection with the development of nickel steel for armor, the

Department has undertaken a series of experiments in the application of this material to other purposes of construction, which promise no less important results than those already attained. If the expectations now formed are realized, it will not be long before nickel steel will be extensively used, both in ship's frames and in marine engines, with a marked improvement both in the strength of the parts and in reduction of weight; while its noncorrodible qualities, already partly demonstrated, point to the probability that it may ultimately present a solution for the harassing problem of preserving the submerged plating of ships.

Certain important considerations connected chiefly with the recent development of ordnance have led the Department to make a change in the form of turrets of several of the ships now under construction, including the three battle ships, and the *New York*, and *Monterey*.

The original armored turret was an upright revolving cylinder, rising from the ship's deck, and working in the later forms upon rollers. Subsequently the fixed turret, commonly known as a barbette, was substituted for the revolving turret, the guns being mounted above the barbette, and revolving upon a turntable. The armored barbette protected the turntable, the mount, and the other appurtenances of the gun, but the gun itself was entirely exposed. This arrangement was adopted for several reasons connected with questions of construction, but principally in order that the gun might be carried higher.

Apart from these reasons it had the advantage of giving greater facility and accuracy in the working of the gun by the gun's crew, and as so large a part of the gun was exposed to fire, it did not seem necessary in view of the advantage gained in the facility of working to inclose the remainder. This entirely unprotected condition of the heavy guns exists to-day in the "Admiral" class of battle ships in the English navy and in many French ships, and was followed by my predecessor in the designs of the *Monterey*.

Since the adoption of the above type, as the rapid-fire gun has been developed in the higher calibers, it has become customary to protect the gun and its crew from the rain of rapid-fire projectiles by a light cover or hood of various forms erected about the gun, and protecting the gunners in front, though open at the rear. This protection is properly a shield, and invariably made of light armor.

In making designs for our new ships it was deemed desirable to advance upon the types of gun shields then in use for heavy guns mounted in barbette. A much heavier weight of armor was employed upon the new design, so much so that it ceased to have the character of a mere shield, and resembled more nearly the turret that was in use before barbettes were invented. It was practically a closed revolving turret superimposed upon a fixed barbette. This arrangement was not only adopted in the new ships, such as the *New York* and the battle ships, but also in certain of the ships already designed, namely, the *Mon-*

*terey*, *Puritan*, *Monadnock*, and *Amphitrite*, the first of which, as already stated, originally gave no protection to the gun itself, while the others had originally been simple turretships of the old-fashioned type.

The uniform system thus adopted, of turrets superimposed upon high cylindrical barbettes, giving protection to the guns far in excess of that in ships of the simple barbette type, even with the addition of shields, and avoiding the defects of the simple turret type, constituted a great advance over any other existing design.

In the turret adopted in these designs the sides were given a slope, so that the structure had the form of a truncated cone. A turret of this shape had been suggested many years ago, and was patented in 1865 by Capt. Eads as his invention; but, as far as is known, it had never been used.

Before the work had proceeded very far, however, two objections became apparent in the use of this inclined form of turret.

The first lay in the difficulty in the manufacture of armor of the weight desired in the prescribed form, and, although this difficulty might have been overcome with time and improved machinery, yet it would have involved, in the case of some at least of the ships, a heavy addition to the cost, and a very considerable delay in completion. The latter objection was particularly important in the case of the *New York* and *Monterey*, which at that time were well advanced.

But the all-important objection to the proposed turret, which became more and more apparent as developments took place in our new ordnance, was the fact that the space allowed within the structure was already insufficient for the free working of the gun, and that the developments pointed unmistakably to the necessity of greater space in the future. These developments related chiefly to the lengthening of the gun, to increased recoil due to the adoption of smokeless powder, and to certain changes in the breech mechanism.

In the opinion of the Chief of the Bureau of Ordnance, whose special duty it is to see to the efficiency of the battery, supported by that of five out of six of the members of the Board on Construction, the efficient working of the guns in the turrets required greater space than was afforded by the inclined form, and this result could only be attained by making the turrets vertical. The same majority of the Board concurred in the opinion that no material loss of defensive protection involved in this change.

Although such a concurrence of professional opinion might properly include the Department, the recommendation was made the subject of rough and minute personal examination before any decision was arrived at. Had there been only a possible doubt as to the efficiency of the guns, it would have been enough to warrant a change, even at the expense of protective qualities, the successful operation of the gun being clearly a prime element of efficiency in a ship of war. The evidence being such as not only to create a doubt, but to

satisfy the Department conclusively that the space was insufficient, and that the cylindrical turret, giving the needed space, involved no serious loss of defensive qualities, it had no hesitation whatever in arriving at its conclusion.

It may be added that our armored vessels, as now under construction, with cylindrical turrets, afford a heavier protection for the inclosed portion of the guns than any other vessels of their type in the world.

The reports presenting the views of both the majority and minority of the Board on Construction will be found in the appendix to this report.

#### VESSELS AUTHORIZED BY THE PRESENT CONGRESS.

The Fifty-second Congress at its first session, by act approved July 19, 1892, authorized the construction of one armored cruiser and one seagoing battleship.

Designs for these vessels have been prepared by the Department, in conformity with the provisions of the act, and proposals for their construction were invited by advertisement on September 28, 1892, ten weeks after the passage of the act.

The law provides that the new cruiser, which has received the name of the *Brooklyn*, shall be of the same general type as the *New York*, and, while the general design of that vessel has been followed, the displacement has been increased by about 1,000 tons, making possible great improvements in seagoing qualities, coal endurance, and disposition and weight of armament. In the new structure a forecastle deck has been added, the freeboard forward has been increased 8 feet, and the forward 8-inch gun turret correspondingly raised. The enlargement of the freeboard increases materially the seagoing efficiency of the ship, permits the working of the guns in the forward turrets in almost any condition of sea, and secures greater comfort for the crew by providing a large additional berthing space.

By narrowing in the ship's side amidships, in the form known as "tumbling-home," a complete fore and aft fire has been secured for the broadside turret guns. Additional advantages gained by this form of the sides are an easier curve of stability and decreased weight of hull, compensating in a measure for the additional weight necessitated by the increased freeboard forward.

The changes in the battery show a marked improvement over the *New York*, being a gain of two 8-inch guns and a substitution of twelve 5-inch rapid-fire guns for the twelve 4-inch guns in the *New York*. The secondary battery is also increased by four 6-pounders.

The 8-inch guns are mounted in pairs in four turrets, one forward and one aft on the middle line, and one on each side amidships. The guns in the forward and after turrets have a train of 310°, while the guns in the broadside turrets have a train from right ahead to right astern of 180°. By this arrangement of battery it is possible to concentrate six

8-inch guns ahead, astern, or abeam, as opposed to four ahead or astern, or five abeam, as in the case of the *New York*. Moreover, the axis of the guns in the forward turrets is more than 8 feet higher than that of the corresponding guns of the *New York*, enabling them to be fought in almost any weather, and giving them a great advantage in plunging fire in the event of fighting at a close range. The 5-inch guns are protected by fixed segmental shields 4 inches thick, as in the *New York*; and as a further protection against fragments of shells exploding between decks, splinter bulkheads 1½ inches in thickness have been worked between the 5-inch gun stations.

Although the indicated horse power of the engines of the *Brooklyn* is the same as that of the *New York* the increased length of the new ship will enable her to obtain approximately the same maintained sea speed.

Her coal supply at normal displacement is 20 per cent greater than that of the *New York*, and the capacity of the bunkers is increased nearly 30 per cent. She can easily go from New York to San Francisco without recoaling.

Comparing the *Brooklyn* with the most recent types of armored cruisers of foreign services, the Department feels perfect confidence in asserting that her offensive and defensive qualities greatly surpass those of any similar vessel afloat or in course of construction.

In the seagoing battleship No. 1, which has been named the *Iowa*, as in the new armored cruiser, a marked improvement on previous designs consists in the addition of a forecastle deck, with increased freeboard forward, and all its attendant advantages.

The strength and arrangement of the battery differs little from that of the coast-line battle ships *Indiana*, *Massachusetts*, and *Oregon*, the principal change being the greater height of the guns in the forward turret, due to the increased freeboard. Four 6-inch guns have been replaced by six 4-inch rapid-fire guns, resulting in a marked improvement in rapidity of fire. Another change has been made by the substitution of the 12-inch gun, weighing 45 tons, for the 13-inch, weighing 50 tons, to permit the use of hand power in manipulation. Since this change was made by the Department in August last, the British Admiralty have resolved upon a similar reduction, and have fixed the weight of heavy ordnance at guns of 50 tons' weight, being governed in this decision by the same considerations that influenced the Department.

The length of the water-line belt has been increased more than 25 per cent, while additional protection has been afforded to the gun stations by a splinter bulkhead on each side of the gun stations on the gun

The maximum sustained speed has been increased to 16 knots, involving a considerable increase in horse power.

In order to allow for the weight taken up by these changes, the side



armor has been made 14 inches and the diagonal armor at the ends 12 inches in thickness. For this reduction in the thickness of armor ample grounds are furnished by the greatly increased efficiency of the armor itself under the new processes adopted by the Department.

The normal coal supply of this vessel has been increased more than 200 tons over that of the *Indiana*, thus materially enlarging her radius of action.

The sides are somewhat narrowed in, to give greater angular range to the battery, while diminishing the weight of hull and flattening the curve of stability. Comparing the *Iowa* with the *Indiana*, we find that she has greater length and beam and more than 1,000 tons additional displacement, and that her increased defensive power, coal endurance, and speed, together with the ability to work the forward 12-inch guns in almost any condition of sea, render her design as a seagoing battle ship a marked improvement over that of the three coast-line battle ships.

#### ARMOR.

No work which the present administration of the Navy Department has been called upon to perform has demanded more constant and absorbing attention or has shown more decisive and far-reaching results than the development of armor. To understand the successive and gradual steps taken by the Department through which this development has been attained, and which have revolutionized the character of armor throughout the world, it is proper to recite the facts from the beginning.

When I assumed office, in 1889, I found that the Department had decided to use all-steel plating for armor. The question, however, arose again shortly after, and representatives of the compound armor manufacture, at their request, were heard at length. No decision was made at this time, the Department being satisfied that the question of armor must be made the subject of exhaustive investigation before a final conclusion could be reached. As the Bethlehem Company were still at work upon their plant, and some time would yet elapse before the manufacture of material could begin, no delay would be occasioned by additional inquiry and experiment.

As time went on, and as fuller examination was made of the history of armor tests in foreign countries, it became apparent that complete reliance could not be placed upon the results of these experiments. In the usual tests of armor plate the weight of the gun, and the velocity of the projectile, were apparently so regulated as to give an easy victory to the plate; and even in competitive tests between rival manufacturers, it seems always to have been arranged that all the competing plates should prove superior to the ordnance, and that the only subject to be decided by the controversy was the question which plate was least injured by the attack.

The imported armor of the *Miantonomoh* had received an inspection test upon delivery in 1884, to see whether the contract had been fulfilled; but no comparative tests of any kind had ever been made in this country, and the Government was therefore placing its entire reliance upon the reports of so-called trials abroad. Upon ascertaining these facts, the Department determined to make its own trials, and in order that it might be hampered by no restrictions as to the character and completeness of its experiment, it purchased outright test plates, both of the all-steel armor of Le Creusot and of the compound armor of Sheffield.

In the meantime, in the year 1889, the Department had directed its attention and inquiries to the possibilities of nickel-steel as a material for armor. The question had been raised by the reported researches of Prof. James Riley, in a paper read before the Iron and Steel Institute in May of that year; and, although the possible application of this material to the armor plating of ships was confined in the report of Riley's investigations to speculative suggestion and discussion, the promise held out seemed too great to be ignored by a government requiring 20,000 tons of armor for its new fleet.

Information received at the same time from private sources of a certain activity in the nickel market in Europe led to the surmise that movements in the same direction were being made in other quarters; and the Department accordingly ordered a thorough investigation to be made of the extent and results of such experiments as might be in progress, especially the proportion, uses, and treatment in the manufacture of nickel steel, both in England and on the continent.

From the report of these investigations it was learned that desultory experiments in nickel-steel armor had been made both in England and France, chiefly with light plates, with results which, although encouraging, had not developed facts of sufficient importance to lead to any change whatever in the policy then pursued by European governments. It was thereupon determined, notwithstanding the novel and experimental character of the enterprise, that when the all-steel and the compound plates were tested, a third plate of nickel-steel should receive a trial under identical conditions. This test plate was ordered of the best foreign manufacture.

The result of this determination was the trial at Annapolis on September 18-22, 1890, which has since become famous. Notwithstanding remonstrances of the armor manufacturers, who represented that one of the 8-inch gun, hitherto unknown in foreign armor trials, and plates of the dimensions in question, would destroy all the armor and afford no test for comparison, it was resolved that the experiments should be made conclusive, and that the plates, or at least the first plate of the lot, whichever it might be, should be tested to destruction. The results are well known. The shots not only perforated but shattered the English compound plate, and the all-steel plate

was broken into four separate pieces, held together only by the serrated edges of the ruptured material; while the nickel-steel, though slightly more penetrable than the last, remained absolutely uncracked, the apertures made in it being plugged by the projectiles, and the integrity of the plate, as the covering of a ship's side, was practically as perfect at the close of the trial as if no shot had been fired.

This experiment was sufficient to demonstrate that a plate could be made with substantially as great a resisting power as that of all-steel armor, which, nevertheless, could not be cracked, and to justify, if not the adoption of nickel-steel, at least the further investigation of its possibilities. The English compound plate was thrown out of consideration at once and forever, and so complete was the demonstration of its inferiority that the Annapolis trials of 1890 may be said to have stripped off, in five shots, half the protection of the armored fleet of Great Britain and of most of the fleets of the world.

In consequence of these trials, Congress, at the request of the Department, made an appropriation of \$1,000,000 with which to purchase nickel matte. The reason for the appropriation at this time, and the mode in which it has been utilized, will be considered hereafter.

During the following year continued and repeated tests were made of various specimens of armor, which so fully confirmed the conclusions formed at Annapolis that the Department came to a final decision to adopt nickel-steel as the material for its armor.

Contemporaneously with these investigations attention had also been given to a recently developed process, named from its patentee, the Harvey process, for hardening the surface of tool steel. It was upon the occasion of considering an offer for this tool steel, in the year 1889, at the Washington Gun Foundry, that it occurred to the officer in charge of the works, Commander Folger, that the process might be successfully applied to armor plate. The matter was referred to the Department, and preliminary tests were undertaken; subsequently a furnace was built at the Washington navy-yard for applying the Harvey method of treatment, and further trials were projected. Experiments were made under the direction of the Bureau of Ordnance, the expense of which was borne by the Government.

It was recognized that the process, if successful, would have a peculiar value when in combination with the newly-developed qualities of nickel steel. The object which had been sought to be reached by the English compound armor was likewise the hardening of the surface of the plate, but the method by which this was carried out, of welding a steel face upon a wrought-iron backing, had the disadvantage of imperfectly uniting the two metals, and showed a fatal tendency both to stripping and cracking the hard face, leaving a soft material in the rear open to the penetration of the projectile. If, however, a plate could be obtained whose surface could be transformed into a high quality of very hard steel without causing the back to lose its toughness, and without pro-

ducing a pronounced plane of demarcation between the two qualities of metal, it would be the ideal armor plate which English manufacturers had vainly sought to produce.

In 1891 the decision was taken to order typical plates of our American manufacturers which should be made the subject of a test as comprehensive as that of the year before at Annapolis. The firing conditions were identical with those of the previous year. This trial was to ascertain two points: First, whether our domestic manufacturers could produce an armor that would stand competition with the material manufactured abroad; and, second, as to the various modes of treatment suggested. The latter question had reference partly to the relative merits of rolling and forging, but more particularly to the effect of the Harvey process.

The new trial took place at Indian Head on October 31 and November 14, 1891. The results were in the highest degree satisfactory. Six plates were tried, three having been furnished by each contractor, representing respectively the rolling and the forging processes. Each of these six plates of domestic manufacture proved superior to the English compound plate, while the Harveied nickel plate, and the high carbon nickel plate were superior to all the foreign plates of the Annapolis trials. Any doubt that may have remained, up to this time, as to the relative merits of the nickel steel and the all-steel plates were finally set at rest. Of the three plates made by Bethlehem, two were of nickel steel, one treated by the Harvey process and the other not, and the third was of all steel Harveied.

Both nickel plates proved to be far superior to the all-steel plate, which was the poorest of the lot, notwithstanding the advantages which it may have derived from the special treatment, and both proved superior to the French steel plate tried at Annapolis. A third nickel plate, manufactured by Carnegie, under the rolling process, also showed marked superiority over the all-steel plate of this year, and both it, and a corresponding Bethlehem plate, showed a capacity of resistance to penetration nearly 10 per cent greater than that of the French all-steel plate. The high-carbon nickel Harvey plate was not only the best of the plates tested but the best armor plate ever subjected to ballistic test up to this time.

As a result of this trial improved methods were introduced in the rolling process and further tests were ordered of new plates. The first of these tests took place July 26, 1892, at Indian Head. The plate used was a 10½-inch plate of nickel steel made by the Bethlehem Iron Company, the plate having first been forged to 12½ inches and then Harveied, and finally reformed to its former dimensions. In the two previous trials the corner shots had been fired from the 6-inch gun, the 8-inch had been used only upon the center of the plate. In this trial the 8-inch was used for all of the shots. The result was that all of the projectiles were broken up upon the surface of the plate,

while the two right-hand shells penetrated to a depth of 13 inches. It was evident that there was a want of uniformity in the hardness of the surface and that some special cause must have softened the right-hand side of the plate. Upon investigation it became apparent that this was due to the process of reforging, resulting in a lower temperature and consequently reduced carbonization upon this side of the plate. Notwithstanding the penetration of the two right-hand shots, the result, by which the plate had remained free from cracks after receiving five blows from 8-inch projectiles, was an extraordinary confirmation of the expectations that had been formed as to the possibilities of nickel steel treated as described.

It remained for a final trial to demonstrate the wisdom of the steps which had been taken, and to crown the efforts of nearly four years with the highest degree of success.

This trial took place at the proving ground of the Bethlehem Iron Company, July 30, 1892. The plate was of nickel steel Harveved, of the same thickness ( $10\frac{1}{2}$  inches) as that of the previous trial, but unlike its predecessor it had been forged to its final thickness before the Harvey process was applied. As in the previous trial the 8-inch gun was alone used. Five Holtzer forged-steel shells, weighing 250 pounds each, with a striking velocity of 1,700 feet per second, and each with an energy of 5,000 tons to the square foot, were fired at the plate at a distance of 30 yards.

Never before these trials had any armor plate in the world been subjected to such a test as was represented by these five blows of a total energy of 25,000 foot-tons.

The result may be told in a word. All five of the projectiles were smashed upon the surface of the plate. The plate showed no signs of injury further than the opening of a slight temper crack 4 inches in length from one edge, and a wale less than 1 inch in thickness on the back of the plate opposite each point of impact. The striking ends of the projectiles appear to have been splashed on the face of the plate, filling the slight indentation made by the blow with new material, which became welded to the substance of the plate itself, and left it as before a flush surface. The remainder of the projectiles could only be found in the shape of innumerable scattered fragments.

The result above described has never been equaled or even approached before by any armor plate, American or foreign. It has demonstrated that the United States, in the reconstruction of its new Navy, which, ten years ago, had no existence even on paper, is enabled to place upon each and all of its armored vessels a material the like of which the world, up to this time, has not seen; and that while vast sums have been spent in plating the sides of foreign men-of-war with an inferior material, this country will employ for the purpose an armor, which is not only far more efficient, but which represents unquestion-

ably, having reference to the dimensions of plates thus far tested, the highest development of modern science, and a development reached by its own independent efforts.

Following the example of the United States the English Government four weeks ago held a trial of the new American armor, and it is clear from the highly successful results of the trial, that the United States instead of being last in the race in the construction of vessels of war or of borrowing its best ideas from abroad, has set an example in this respect which other maritime powers will speedily follow.

#### ARMOR CONTRACTS.

The contract for armor made by my predecessor June 1, 1887, with the Bethlehem Iron Company, provided for the manufacture of about 6,700 tons of material; the plant for the manufacture to be completed two and a half years from the date of the contract, that is to say, December 1, 1889, and a delivery of 300 tons to be made within two months, or by February 1, 1890. Deliveries were to continue from that date at the rate of 300 tons per month, and the whole amount mentioned in the contract was to be delivered by February 1, 1892.

The delays incident to the completion of the Bethlehem plant have been fully referred to in each of the annual reports of the Department. In January, 1890, the company stated that they would be ready to begin manufacturing within six months, and would be able to deliver from 1,500 to 2,000 tons in that year. The end of the year passed, however, without any deliveries under the contract. During the year 1891 some slight progress was made, and in the annual report of that year the Department was able to record the delivery of certain small lots of armor, amounting to about 100 tons. At the present time, December, 1892, ten months after the time for final delivery and five years and six months after the signing of the contract, the total amount received from the Bethlehem Iron Company on its contract for 6,700 tons is 955.75 tons.

Although the Department was disposed to make all possible allowance for the difficulties of beginning the manufacture of armor, in the hope that the Bethlehem Company might be able to make an approximation to the fulfillment of its contract, it nevertheless foresaw during the course of the year 1890 that unless some step was taken to provide additional supply the completion of all the armored ships then under construction would be delayed for an indefinite time. To prevent this, contract was made November 20 of that year with Carnegie, Phipps Co. to make and deliver about 6,000 tons of armor at the price fixed in the Bethlehem contract. The time allowed for deliveries to us, July 1, 1891, was too short to enable the company to complete necessary extension of its plant. Up to the present date, however,

it has delivered under its contract 783.93 tons of armor, or nearly the amount supplied by the Bethlehem Company under its contract of 1887.

Neither company is at present making such progress in the work as the Department could desire, but both are increasing their output from month to month, and the Department is now preparing to advertise for proposals for the remainder of the armor required to complete the vessels now authorized.

The condition of the armor contracts was referred to by the House Committee on Naval Affairs in the able report of Mr. Herbert, of Alabama, on March 10, 1892, in the following terms:

The difficulties to be surmounted by this company [Bethlehem] seem to have been much greater than were expected. They have only just now fairly begun the delivery of armor plates, and are not yet able to furnish the required amount monthly. But the plant they have established is said to be unequaled in the world, and we may confidently expect better results in the near future. The present Secretary of the Navy, Mr. Tracy, in his last report, says:

"The more this subject is studied the more remarkable appears the foresight and judgment with which the first contract of 1887 was effected."

Your committee are gratified to be able to state that the present Secretary of the Navy, Mr. Tracy, "in view of the delays incident to the work under the Bethlehem contract, \* \* \* in the summer of 1890 endeavored to secure a second source of supply, and on November 20 of that year entered into a contract with Messrs. Carnegie, Phipps & Co. for 5,900 tons of armor plates at the same price as that stipulated in the Bethlehem contract."

In my report for 1890 I stated that "the Bethlehem contract of 1887 was justly considered the crowning triumph of my predecessor," and I take occasion to say here that the establishment of the two armor plants now in operation at Bethlehem and at Homestead is worth to the United States Government, without regard to the armor supplied therefrom under existing contracts, all the money that this armor will cost. When these plants are able to turn out, as will shortly be the case, the full quantity of armor required by the contract, the aggregate supply will still amount to only 9,600 tons per annum, or not more than enough for the construction of three battle ships.

To provide the armor for eight such ships, in addition to those now authorized, would require three years after the fulfillment of the present contract, with the works running at their full capacity. It is the belief of this Department, in common with the Naval Committee of the present House, that this number of additional battle ships is essential to the protection of the United States. It is upon such vessels that this country, as well as others having a seaboard, relies and must continue to rely for purposes of defense as long as naval warfare remains what it is to-day. Without them we are helpless at sea. With these plants in existence, we can not only armor the ships now authorized, but we have the means at hand for armoring the others if we make our preparations in time. The value to the United States of the mere possession of two such establishments can not be expressed in words or in figures.

## PURCHASE OF NICKEL.

In consequence of the high efficiency of nickel steel as a material for armor disclosed at the Albatross trials in September, 1890, and the absolute necessity that the Department should be able to control a sufficient supply of nickel, which the territory of the United States, as far as was known, did not afford, application was made to Congress for an immediate appropriation for the purchase of nickel matte. By a resolution of September 29, 1890, an appropriation of \$1,000,000 was made for this purpose. Before entering upon extensive purchases, however, it was thought prudent to make further tests, and with this view, as stated in the annual report for 1890, a limited quantity of nickel, amounting in value to about \$50,000, was purchased from the Canadian Copper Company.

After making further experiments the Department came to a decision, the correctness of which subsequent developments have fully confirmed, to employ this material in the manufacture of armor. A contract was entered into June 15, 1891, between the Canadian Copper Company and the United States, represented by the Secretary of the Navy, for the purchase of 4,000 tons of nickel and copper matte. The terms of the contract provided that the material should be delivered on board cars at Sudbury, Ontario, for transportation to such points as might be designated. Deliveries were to begin within three days from the date of the contract, and final deliveries were to be made within one month thereafter. Provision was made by means of competent assayers for ascertaining the quantities of nickel and copper contained in the matte, and that no carload should be shipped in which there was less than an average of 15 per cent of nickel.

The importance of intrusting to the Navy Department the authority given by the act above referred to, and the necessity of early action to obtain a supply of nickel at a reasonable price, were shown by the results. It was foreseen that the experiments then in progress would increase largely the commercial demand for nickel, and put up the price, while the limited number of mines from which a supply could be obtained would enable their owners practically to control the market. The subsequent course of events demonstrated the wisdom of thus taking early action. Of the nickel oxide produced by the Orford Company, by whom the refining is done, we are now using 40 per cent, while 60 per cent is sold in Europe. Our material, after the payment of all charges, including the price of the matte, and of the subsequent reduction, costs us 24 cents a pound, while that of other consumers costs at least 38 cents.

A statement of the account of the appropriation made by the act of 1890 referred to is appended.



*Account for purchase of nickel.*

[Resolution of September 29, 1890.]

## To expenditures for nickel:

## Canadian Copper Company:

Original purchase.....	\$48,166.05
Contract of June 15, 1891.....	273,155.81
Freight on ore from above company .....	31,134.88
Refining ore by Orford Copper Company.....	42,582.30
	<b>\$395,039.04</b>

Add duty on copper in the imported matte, which having been paid to the Treasury does not enter into the cost of the material .....

9,547.40

404,586.44

Liabilities, refining (estimated) .....

55,000.00

Total cost of nickel .....

459,586.44

To amounts reappropriated for other purposes under Bureau of Ordnance, by acts of March 2, 1891, and July 16, 1892.....

200,000.00

Balance available .....

340,413.56

Total appropriation.....

1,000,000.00

## ORDNANCE.

The manufacture of modern high-power guns has been distributed between the last three administrations as follows:

	4-inch.	5-inch.	6-inch.	8-inch.	10-inch.	12-inch.	13-inch.	Total.
1881-'85.....		2	1					3
1885-'89.....			32	8	3	0	0	43
1889-'93.....	35	26	102	22	22	6	1	*214
Total .....	35	28	135	30	25	6	1	280
Total required.....	74	68	126	67	22	12	12	381
Remaining to be completed.....	39	40	.....	37	.....	6	11	121

\* Including 23 in process of construction which will be completed during this administration.

The above table is based on the actual work done to date and estimated work at existing rate of output until March 4, next.

The following table gives the number of guns completed, partly completed, and afloat:

Caliber of gun.	Completed at date of last report.	Completed at this date.	Partly completed.	A float.
4-inch.....	7	35	32	2
5-inch.....	3	14	31	2
6-inch.....	117	135	0	90
8-inch.....	19	23	12	14
10-inch.....	8	25	0	6
12-inch.....	1	5	1	2
13-inch.....	0	0	1	0
Total .....	155	237	77	116

Of the above, 82 have been completed during the past year. The greatest progress has been made with the rapid-fire gun, of which twenty-eight 4-inch and eleven 5-inch have been completed since the last report. These guns, upon which little had been done up to last year owing to the time required to perfect a suitable breech-mechanism, are now rapidly approaching completion. The difficulties experienced in the manufacture of suitable metallic cartridge cases have now also been overcome.

Of the 6-inch guns, the manufacture of which was most advanced, 135 have now been completed. Contracts have been made for forgings for six new 6-inch guns of 40 calibers in length, to be used with brass cartridge cases as rapid-fire guns and to be supplied to the fastest cruisers.

Of the 8-inch guns, twenty-three are now completed and twelve partly completed.

All the 10-inch guns, twenty-five in number, have been completed and are ready for installation on the ships for which they are intended.

Five 12-inch guns have been completed, of which two have been proved and are being installed on the *Monterey*.

The first 13-inch gun is approaching completion and the forgings of the second have been received.

In reference to the ordnance of the Navy in general, three developments have been reached during the past year which promise greatly improved results.

The first of these is the application to guns of medium caliber of an improved breech mechanism and fixed ammunition, which form the two essential features of the so-called rapid-fire type. Up to a recent period, the rapid-fire system was only applied to guns of the secondary battery, of which the largest was a 6-pounder. Since then a further application has been successfully made to 4-inch, 5-inch, and even 6-inch guns, notwithstanding the predictions generally made abroad that the 5-inch was the extreme limit of rapid fire. The 4-inch, of which 35 have been completed, has attained in actual trial a rapidity of fire of five rounds in 14 seconds, or twenty-one shots a minute. In the 5-inch a rate of five rounds in 19 seconds has been attained. For the 6-inch, the metallic cartridge cases have not yet been manufactured; but even without this necessary feature, the application of the new breech mechanism to the gun has resulted in a rate of fire of ten rounds in 2 minutes 57 seconds, or nearly double the rate of the inary service type.

The experiments thus far made have nearly reached the point of conclusive demonstration that both the metallic cartridge case and the manually-acting breech mechanism operated by hand can be used in guns of larger caliber. An improved device for manipulating the breech of heavy guns by hand has had the effect of nearly quadrupling the rate of fire. When to this is added the benefit of doing away

with the sponging, the use of the gas check, and the inconvenient and clumsy method of stowing powder, the development of the new system can be considered as little less than revolutionary.

The second change, which is indirectly connected with the improved breech mechanism for large guns, consists in an improvement in gun-mounts. The general direction of the improvement is in the substitution of hand power for hydraulic power. This feature has been worked out successfully in the design of carriages for the 8-inch gun, which can now be manipulated by hand power throughout. The design has been applied to the mounts for the 8-inch guns of the *New York*, the *Olympia*, and the three battle-ships. The practical results are a great decrease in weight, which has hitherto been required for the hydraulic machinery, and the elimination of the possibility of putting the gun out of action by an injury to the complicated hydraulic mechanism.

It is believed that a further extension of the system can be made by which it will be possible to secure a part of these results in even higher calibers by supplementing the hydraulic power with a method of hand manipulation.

The development of the new methods of mounting the higher calibers, in consequence of the special investigation undertaken by the Department, has carried with it changes of great importance not only in reference to rapidity of fire, but to the length of recoil and the space necessary at the rear of the gun for an efficient service. This demand for space has been increased by other considerations, of which the most important were the length of the bore of the guns, the prospective adoption of smokeless powder, thereby increasing the recoil, and the application of a hand-operating breech mechanism, which required standing room behind the gun.

The necessity of these improvements in mounts for heavy guns has been demonstrated by the recent experience of the Department with the 10-inch guns of the *Miantonomoh*. The mounts of these guns, designed sometime ago, of an early type, have been practically tested for this year for the first time by firing at sea. Although no serious defects have been developed in the mechanism, the mounts can not be considered as satisfactory, in the light of recent progress made both here and abroad, and it will be desirable to replace them at some future time with others of more modern design.

The third change consists in the application to guns of the experiments, which, in other directions, have been one of the marked features of this administration, in the use of nickel.

The physical qualities of nickel steel are more than 10 per cent higher than those of ordinary gun steel, and, in order fully to test its merits, the forgings have been ordered for an 8-inch gun, the parts of which, greatly simplified from those in ordinary use, are to be assembled according to a special process proposed by Mr. William Sellers, of Philadelphia. It will be seen that in this gun two distinct experiments are being tried; the first in the use of nickel steel, and the second in

the new mode of assembling. There is little doubt from what we already know of the qualities of nickel steel that the experiment will result in a marked improvement in the quality of the gun, and it is believed that the new process will insure a still further reduction in the cost of manufacture.

The appliances of the Washington gun factory have been developed until it is acknowledged to be one of the foremost establishments of the kind in existence, both for efficiency and economy of work. In this development, as in all other branches of ordnance work, the Department refers with pleasure to the great ability and energy of Commodore William M. Folger, whose services as the chief of the Bureau have been of great value to the country.

In the course of fifteen months, the requirements of the ships now authorized, except as to the 13-inch guns, the forgings for which can not be delivered in time, will for the most part have been met; but it is to be hoped that other ships will be authorized, and that there may be no interruption in the work now going on. If the building of the new navy should be arrested, and no other occupation found for the gun factory, its operation would be suspended at great injury to the establishment and loss to the Government. Whether or not the armament of sea-coast fortifications should be placed, as in most European countries, under the charge of the Navy, the resources of these great and successful works should at least be utilized in the manufacture of such an armament, rather than be permitted to fall into disuse and decay.

#### POWDER.

The brown powder manufactured by Messrs. Dupont & Co., of Wilmington, Del., for general service use in heavy guns continues to give excellent results in guns up to 10-inch caliber, no difficulty being found in obtaining initial velocities of 2,000, 2,100, and 2,175 foot seconds respectively in guns of 30, 35, and 40 calibers length of bore, with a maximum pressure not exceeding 15 tons per square inch.

A most important step in advance in the manufacture of powder during the past year has been made by an arrangement under which the California Powder Company, of Santa Cruz, Cal., is to undertake the manufacture of brown powder for the Navy. This company has been furnished by the Messrs. Dupont with the result of the latter's experience in powder manufacture, and it is confidently expected that they will soon succeed in duplicating the products of the Duponts' works. In event of hostilities, the importance of a powder manufactory on the coast can not be overestimated.

It became apparent to the Department early in this administration unless it was content to fall behind the standard of military and naval armaments abroad in respect to powder, it must take some steps to develop and to provide for the manufacture in this country of the new powder, from which extraordinary results had been obtained

in Europe. With this object negotiations were at first attempted looking to the acquisition of the secret of its composition and manufacture. Finding itself unable to accomplish this the Department turned its attention to the development of a similar product from independent investigation. The history of these investigations and of the successful work performed in this direction at the torpedo station has been recited in previous reports. It is a gratifying fact to be able to show that what we could not obtain through the assistance of others we succeeded in accomplishing ourselves, and that the results are considerably in advance of those hitherto attained in foreign countries.

Up to the date of the last annual report of this Department, the smokeless powder had been tested only in small arms, 3 and 6 pounder rapid-fire guns, and once in a 4-inch gun. During the past year additional experiments have been made with this powder in 4-inch, 5-inch, and 6-inch guns, with excellent results. There is now every reason to believe that it will entirely replace the ordinary powders in all guns of smaller caliber in the near future, and that its use will gradually be extended up to the largest calibers. During the past year 1,500 pounds of this powder have been made at the torpedo station at Newport.

Successful experiments made in various ways have determined its stability and safety. The powder when placed in an iron vessel, wrapped in felting, and exposed to a temperature of  $208^{\circ}$  for six hours, was absolutely unaffected. In another case a quantity similarly treated stood a temperature of  $212^{\circ}$  for twenty hours before showing signs of change. A third sample, exposed to a temperature of  $-5^{\circ}$ , was likewise unaffected. Attempts to detonate the powder when it was closely confined in iron cylinders have failed, the cylinders being ruptured and the powder merely scattered. The powder manufactured for use in the 6-inch rapid-fire guns was stored at the Indian Head proving ground through a period of six months, covering a hot summer, and at the end of that time showed no change in a firing test.

Some of the results obtained with this powder are tabulated below:

Gun.	Length of gun.	Weight of shell.	Charge.	Muzzle velocity.	Pressure.
	<i>Calibers.</i>	<i>Pounds.</i>	<i>Pounds.</i>	<i>Foot seconds.</i>	<i>Tons.</i>
4-inch R. F. ....	40	33	$5\frac{7}{8}$	2, 160	15. 0
5-inch R. F. ....	40	50	$13\frac{1}{4}$	2, 578	15. 6
6-inch B. L. R. ....	40	100	26	2, 469	13. 9

A comparison of these results with those published as obtained abroad (giving due weight to the different lengths of bore and weights of projectile) shows the marked superiority of the American smokeless powder, which gives higher and more regular velocities with much lower and much more uniform pressures.

Since the publication of the report of the Bureau of Ordnance, a private firm (the Duponts) have developed methods of modifying the characteristics of the naval smokeless powder, having reference to a form

of granulation which shall be capable of ready ignition, and also to the ability to control the rate of burning. It is believed that these modifications solve the problem for all calibers, including small arms, for both propelling and bursting charges.

#### HIGH EXPLOSIVES.

The extension of the Department's resources for manufacturing gun cotton, referred to in the last report, has been attended with excellent results. Of the 50,000 pounds ordered from the Messrs. Dupont, previously mentioned, 20,000 pounds have been delivered and accepted. During the year 20,000 pounds of gun cotton were manufactured at the torpedo station at Newport, which has now doubled its capacity and will produce 64,000 pounds per annum. This development derives additional importance from the greatly extended use of gun cotton as the base of smokeless powder.

The important characteristics of Emmensite were pointed out in the last report, and are still the subject of experiment. For this purpose a 6-inch wire-wound gun was used, and shells filled with Emmensite have been fired from this gun with a velocity of 2,000 foot-seconds that exploded on impact with water at a range of 6,000 yards.

Another high explosive has been developed at the torpedo station during the past year which seems to show remarkable possibilities. A number of rounds were fired from a 4-inch rapid-fire gun with a velocity of 2,000 foot-seconds; and a common shell of the tubular manufacture, filled with this explosive, has been fired through six 1-inch plates and exploded detonatively beyond them. Since the publication of the report of the Chief of the Bureau of Ordnance further developments have taken place leading to the conviction that this explosive can be fired from high-power guns of all calibers.

#### PROJECTILES.

As already pointed out, perhaps the most serious defect in our naval armament, up to a very recent time, has been the want of armor-piercing projectiles. The fact of the domestication in this country of the manufacture of these projectiles and of a contract entered into with the Center Steel Company, of Reading, Pa., was stated at length in last report. A second contract has also been entered into with factory results. The Sterling Steel Company, of Delmar, Pa., also undertaken the manufacture of armor-piercing shell and an order for 100 6-inch shells has been filled. This company is likewise engaged with the manufacture of high calibers.

A recent comparative test of 8-inch projectiles, using two specimens of the Holtzer, the Carpenter, and the Sterling shells, was made in the Gun Head. The test was to show the comparative effect of impact upon the shape of the shell, the distortion or "setting in" measured by the decrease in length of the projectile and its diameter due to bulging. The results of this test were extremely instructive and interesting. The Holtzer shells, the standard

projectile of Europe, showed a decrease in length in both cases of 1.25 inches and a maximum increase in diameter of 0.91 inch and 0.89 inch, respectively. Of the Carpenter shells, one showed a decrease in length of 1.24 inches and the other of 1.61 inches and a maximum increase in diameter of 0.45 inch and 0.72 inch, respectively. The Carpenter shell also showed slight cracking.

Of the two Sterling shells, one broke into fragments and was therefore the poorest of the lot. The other, however, showed a decrease in length of only 0.28 inch and a maximum increase of diameter of only 0.17 inch, the shell remaining so completely intact that after penetrating 13½ inches into the plate and coming out it showed no difference appreciable to the eye from a similar projectile that had not been fired. As these were the first 8-inch shells made by this company according to their own process, the result is exceedingly encouraging, demonstrating as it does the possibility of a superiority in this branch of naval ordnance of American manufacture far beyond anything that had been anticipated when it was undertaken.

The manufacture of the smaller sizes of shell capable of penetrating light armor for 3 and 6 pounder guns has also been satisfactorily established in this country. Notwithstanding the severe requirements which manufacturers must fulfill there are at present three companies in America which have succeeded in overcoming all difficulties in producing these varieties of projectiles.

Experiments have also been made in the interest of economy to ascertain whether it is not possible to develop a cast-steel shot which might serve in part as a substitute for the more costly forged-steel projectiles. The experiments thus far made are encouraging and will probably result in a considerable reduction in expense.

Of cast-iron common shell, 12,000 have been made at the Washington navy-yard, of calibers from 4 to 13 inches. The native production of steel common shell of various kinds has made great advances. Forged steel shell of a satisfactory quality have been turned out in great numbers for 4, 5 and 6 inch guns, and the process is shortly to be extended to the 8-inch. Steel shell made by the electric welding process have also been furnished for the 6-pounder and 4-inch guns.

The shells made by the above processes not only carry large bursting charges but are capable of passing through a considerable thickness of steel armor, without breaking, while the cost of production is but little in excess of cast-iron shell.

The necessity of cast-steel shell for the heavy calibers has led to the domestication of their manufacture, during the past year, in this country, by the Hadfield method, and contracts have been entered into for the supply of this shell for the 10-inch and 12-inch guns.

The extent to which the development of projectiles of domestic manufacture has been carried during the past year is shown by the fact that the different varieties mentioned above are to-day the product of

eight different firms, in as many different localities, none of which had manufactured a single projectile prior to the year 1889.

#### TORPEDOES.

So much had been accomplished during the civil war and the period following it, in the development of stationary torpedoes, and so much interest and comment were aroused by the successful introduction of this new weapon of naval warfare, that the public generally was under the impression that however much the United States might be lacking in ships of war, its naval resources included a complete torpedo system, which would be the main element of its maritime defense in time of war. This vague reliance upon the torpedo, which in the popular mind seemed the most destructive weapon in existence, appeared again and again in the public prints, and was one of the arguments in general use against the proposed rebuilding of the Navy.

In these discussions the fact was ignored or forgotten that subsequently to the war an entirely new form of torpedo warfare had been perfected abroad, by the use of a floating structure, whose elaborate mechanism was a secret of the manufacturers, and which carried its own power of movement and direction within itself. This weapon, known as the auto-mobile torpedo, of which the Whitehead was, if not the only successful example, certainly by far the most successful, had been introduced into all foreign services of importance, and great numbers had been procured by all the naval powers of the world, except the United States. Our own Navy, however, was absolutely destitute of any provision of this nature.

At the beginning of this administration, therefore, although all the ships had been designed for the use of this weapon, and a torpedo boat had been projected, and in part constructed, sometime before, whose only purpose was to discharge auto-mobile torpedoes, the weapon itself was wanting. Before this date the hopes, rather than the expectations, of the Department seem to have gradually concentrated themselves on the Howell torpedo, which was still a doubtful experiment, and a contract had been made January 5, 1889, with the Hotchkiss Ordnance Company, the manufacturers of the weapon, for thirty torpedoes, of which were to be delivered by June 1, 1890, and all by September 1 of the year.

Without going into the difficulties and delays experienced by the manufacturers of the Howell torpedo, and its repeated tests and trials, is enough to say that the attitude of the Department in reference to the torpedo has not yet gone much beyond the stage of hope with which it had entered upon the contract now four years ago in January. The last of these trials has given great promise, however, and the torpedo has been accepted.

The Department, while desiring to give every opportunity to the Hotchkiss Company for achieving ultimate success, did not feel justified in continuing the experiment; for the long period of experiment during which it might be,



and, as the result shows, actually was compelled to wait. Nor was it willing to advise the purchase of torpedoes abroad which, however they might relieve immediate necessities, would leave the Government dependent perhaps at a critical moment upon foreign resources, believing it to be a cardinal principle that the United States should be at all times in a position of absolute independence in reference to the supply of its war material.

Negotiations were therefore undertaken with a view to domesticating in this country the manufacture of the Whitehead torpedo, a weapon whose use in actual war had proved it an assured success. All difficulties were gradually overcome, and in May, 1891, a contract was entered into for one hundred 18-inch Whitehead torpedoes of the most recent type. The E. W. Bliss Company, Limited, with whom this contract was made, entered upon the undertaking with zeal, and have brought great skill to the development of the new manufacture. Considerable delay was occasioned by the difficulty of obtaining a suitable air flask, but this obstacle has been overcome, and the company have actually completed twenty of the torpedoes called for under their contract. The steel forgings from which the air flasks are made possess physical characteristics considerably in excess of those manufactured abroad, and the Department is now able to state that the Navy for the first time has a certain prospect of presently acquiring a full supply of auto-mobile torpedoes of the best modern design and of American manufacture.

In view of this certainty, launching tubes have been ordered for distribution among the vessels to which they are assigned. Three tubes have already been installed on board the torpedo boat *Cushing*, one fixed in the bow, and two mounted on a turntable on deck, and upon test have proved satisfactory. This vessel, which up to the present time has been of no practical use except for practice in navigation and manœuvring, now for the first time merits its name of a torpedo boat. The second vessel of this type, now building at Dubuque, will be capable of service as a torpedo boat as soon as its construction is completed.

Of the so-called dirigible torpedoes, intended to be controlled from a fixed station, the three Patrick torpedoes have undergone their official trials and been accepted, and two of them have been sent to the Pacific coast. The Sims-Edison Company has also delivered one of its torpedoes at the torpedo station to be used in a series of projected experiments.

In order to settle the numerous and difficult questions connected with the installation of the auto-mobile torpedoes with which the fleet was to be supplied, the Department on August 15, 1891, organized a torpedo board, composed of three officers, under whose general direction the work has been satisfactorily carried on.

#### VESUVIUS TRIALS.

A statement was made in the last annual report of the inconclusive character of the trials of the *Vesuvius*, which were held in May, 1891, and of the recommendation of the Board thereon.

In accordance with this recommendation a further test was decided upon and orders were given for a supply of projectiles, and for certain changes in the mechanism of the guns recommended by the Board. Great delay was experienced in procuring projectiles, owing to the bankruptcy of the Dynamite Gun Company, but all have now been furnished, and the changes in the valves have been completed.

Arrangements were made to hold the trials in Narragansett Bay in the early autumn, but other requirements of the service, and subsequently a slight accident to the machinery caused a postponement. The trials have now been ordered, and will be held at Port Royal at an early date, a board having been appointed to witness them and make a report to the Department.

#### INCREASE OF THE NAVY.

Another year of experience, of discussion, and of criticism both at home and abroad, confirms the Department in the views which it adopted in the annual report of 1889 as to the policy of construction which the Navy should pursue.

The policy then advocated, which was a radical departure from any view previously presented in this country, consisted in the production of three principal types: First, the armored battle ship of 10,000 or more tons; second, the armored cruiser of from 8,000 to 9,000 tons, and, third, the commerce protecting and destroying cruiser, of extreme speed, of 7,500 tons.

In reference to these types, and especially to that of the battle ship, the Department can not do better than quote from the very able report of Hon. H. A. Herbert, chairman of the House Committee on Naval Affairs, to whose efforts in common with those of his predecessor in the last Congress, Hon. C. A. Boutelle, sustained by their clear perception of our naval necessities, and by unremitting devotion to the work of

al reconstruction, the success of the past eight years is largely due. This report, submitted at the first session of the present Congress, Mr. Herbert says:

It may be taken for granted that we do not need to build a great and expensive navy like those of Great Britain and France, but certainly the time has come when it would be well to form some distinct and definite idea of the position we are after to occupy among the naval powers of the world.

To regain the relative position among these navies we occupied prior to our civil war is certainly not too much to attempt, especially as we know now that we have as efficient coast defenses as we then believed ourselves to possess.

To reach this point it is not disputed that we need more first-class battle ships. We have now only three authorized. Eight or nine more of these, in addition to our armored fleet, would give us a respectable navy, sufficient, perhaps, for our pur-

suance of these views, Congress, at the same session, authorized the construction of one additional battle ship, to be of the sea-

going type, and provided with a greater coal endurance than those previously authorized.

The views of the committee on the subject of battle ships are in perfect accord with those repeatedly expressed by the Department during the last three years. Before the first battle ships were undertaken the number required was fixed at twenty. In the report for 1890 it was stated that such was the great power, both offensive and defensive, of the design evolved, that the Department could safely modify its previous figure, and that twelve such battle ships as were then in course of construction would equal in efficiency, for our purpose, the twenty that were previously contemplated. Four have now been authorized, and it remains to provide eight more, or twelve in all, of which eight should be stationed on the Atlantic coast and four on the Pacific.

In reference to the second type, the same report says:

Next in importance to these are strong and swift commerce destroyers, such as the *New York*, which is armored with 5 inches of steel, sufficient to protect its crew against the destructive missiles of rapid-fire guns. This ship is believed to be the best "all-round" ship in the world, combined speed, endurance, and fighting capacity considered. Nothing can be a more effective argument for continued peace than such a vessel as this, especially when considered by a nation having a large commerce afloat.

In reference to other armored ships the Department agrees perfectly with the following statement of the committee:

In our earlier efforts to rehabilitate the Navy attention was directed first to the construction of such smaller vessels as would certainly be necessary for the all-round purposes of the Navy. The five monitors of which we directed the completion (the *Terror*, the *Amphitrite*, the *Monadnock*, the *Puritan*, and the *Miantonomoh*) are all coast-defense vessels; able to take the sea, it is true, but not capable of fighting to advantage in a sea way.

The *Maine* and the *Texas* were the first sea-going armored vessels projected since we began the construction of the new Navy. These ships, while very useful, can neither of them properly be denominated as battle ships. They were not designed to meet the most formidable of modern vessels, but they were as large and as expensive as it was deemed prudent at the time to undertake.

In reference to vessels of the ordinary monitor type, as distinguished from the development of that type which recent years have seen in the battle ship, the Department reiterates the views which it has previously expressed, that there is no advantage to be gained in building vessels of this description. Its well-recognized form requires a low freeboard and light draft. From these conditions the characteristic defects of the vessel in fighting at sea are inseparable. Such a vessel can not attain a high speed. It can neither overtake nor escape from a battle ship. The difficulty of controlling its movements, both in the matter of speed and of direction, places it at the mercy of any adversary with equal means of offense and defense. Its marked defects in this respect are increased in a sea way by the resistance of the heavy seas which are constantly breaking on board. Its comparative smallness of target, usually mentioned as one of its chief advantages, is rather apparent

than real, for the portions of the battle ship which enlarge the size of the target, although vulnerable, are not indispensable to the safety or fighting efficiency of the vessel.

The effect of injuries upon the hull of the monitor is far more serious, in view of its slight reserve of buoyancy, than the effect of similar injuries upon the vessel of higher freeboard, and when to this is added the great subdivision practicable in the latter type the comparative conditions of safety in the monitor are enormously reduced. But perhaps the chief defect to be found in the low freeboard vessel is the serious disadvantage under which the guns are fought in any except the smoothest water. The movement of the vessel, following closely the surface of the wave, while free, as in the case of a raft, from the apparent roll observed in ships of greater depth and greater freeboard, is such as to give little chance for accurate aim and for a great part of the time to shut out an adversary completely from view. In a heavy sea the guns can not be fired at all. For these reasons the Department earnestly indorses the maxim laid down in the House report already quoted, that "our true naval policy for the future is to construct hereafter, principally if not entirely, only first-class cruisers and first-class battle ships, with their accessories."

In the class of unarmored, as in that of armored cruisers, it should be the object to build only vessels of the highest type. The *Columbia*, and her sister ship the *Minneapolis*, stand at the head of this class of vessels in speed, in coal endurance, and in every other essential quality. They have a maximum speed of 22 knots, a sustained sea speed of 21 knots, and they can be safely depended on in any ordinary sea to overtake any commerce destroyer, any commerce protector, or any mercantile vessel now afloat, while their ability to cruise for great distances without recoaling, makes them a peculiarly important addition to a navy destitute of coaling stations abroad.

In the annual report of the Department for 1889, the following statement was made in reference to the necessity of cruisers:

It must be remembered, however, that cruisers have another and equally important function in the attack and defense of commerce. Any staunch vessel with a good coal capacity and the highest rate of speed, armed with a few rapid-firing guns, though built and used principally for commercial purposes, may by certain adaptations in her construction be made readily available for this form of warfare.

The fast transatlantic liners, nationalized in foreign countries, but supported and maintained by American trade and American passengers—many of them even owned by American citizens—are a powerful factor in the naval force of the governments whose flag they bear and at whose disposal they must place themselves in time of

as a matter for serious consideration whether steps may not be taken towards  
 a tion of such a fleet of specially adapted steamers of American construction,  
 a by American merchants, carrying the American flag, and capable, under well  
 d conditions, of temporary incorporation in the American Navy. The advan-  
 s of such an arrangement, which enlarges the merchant marine and makes it at  
 time self-protecting, are overwhelmingly great. The difficulty is that Amer-

ican capital will not be drawn into the enterprise unless it can be sure of specific compensation for the concessions which it makes to the Government; first, in the adaptation of its vessels to the latter's needs, and secondly, in the surrender of a privilege to use them when the exigency arises.

In the absence of such an arrangement the naval policy of the United States can not neglect to take account of the fleets of fast cruisers which foreign states maintain under the guise of passenger and merchant steamers. They constitute an auxiliary navy, and must be reckoned as a part of the naval force of the governments maintaining them. It is difficult to imagine a more effective commerce-destroyer than the steamship *City of Paris*, armed with a battery of rapid-firing guns. She can steam over 21 knots an hour, and can average 19.9 knots from land to land across the Atlantic. No man-of-war could overtake her; no merchantman could escape her. A fleet of such cruisers would sweep an enemy's commerce from the ocean. This fact is well understood in Europe, and States that are unprovided with a convertible merchant fleet are preparing to meet the possible emergency by partly protected cruisers that are substantially as fast as the *City of Paris*.

Our deficiency should be supplied either by a line of fast merchantmen, constructed with special reference to use in time of war, which will enable the Government to avail itself of their services at critical moments, or we should build a fleet of at least five first-class cruisers of the very highest rate of speed, certainly not less than 22 knots.

It was upon this recommendation that Congress at the following session authorized building the *Columbia*, and in the next year a sister ship the *Minneapolis*, of the same general type. About the same time other legislation was adopted which was destined to supplement these cruisers by vessels from the merchant marine. The act of March 3, 1891, authorized the Postmaster-General to enter into contracts with American citizens for the carrying of mails on American steamships, which should be capable of prompt and economical conversion into auxiliary naval cruisers, and which might be taken and used by the United States as transports and cruisers upon payment to the owners of their fair and actual value.

Under the terms of this act 21 vessels have been inspected by the Navy Department with a view to entering into contracts for mail service.

Another act of great importance, approved May 10, 1892, entitled "An act to encourage American shipbuilding," provides that the Secretary of the Treasury shall be authorized to grant registers as vessels of the United States to certain foreign-built steamships of not less than 8,000 tons and capable of a speed of not less than 20 knots, belonging to foreign corporations, not less than 90 per cent of whose stock is owned by citizens of the United States, upon the acquisition of a complete transfer and title by the American owners of such majority interest to the steamers, with this important provision, that the American owners shall build, in American shipyards, steamships of an aggregate tonnage of not less than the amount of the steamships so admitted to registry, each steamship so built and contracted for to be of a tonnage of not less than 7,000 tons. The act further provides that any steamship so registered may be taken and used by the United States as a cruiser or transport upon payment to the owners of the actual value.

Under this law it is understood that the two fastest steamers now engaged in transatlantic commerce, and probably the two fastest merchant steamers in the world—one of which is the identical vessel referred to in the report for 1889, the *City of Paris*—will be admitted to American registry, and in fulfillment of the condition prescribed by the law a number of new vessels of similarly high qualities (probably not less than four) are to be built in American shipyards.

When the Department made its recommendation in 1889 it did not venture to hope that within the short space of this administration it would see this complete realization of its suggestions for the creation out of the merchant marine of an auxiliary navy of commerce-destroying and commerce-protecting cruisers of the highest speed; and among the triumphs that have been witnessed in the gradual solution of the difficult problem of naval development in the United States it regards this as by no means the least. The progress of the Navy and of the merchant marine should go hand in hand. Each should be the help-mate of the other. It is therefore earnestly recommended that the same principle, which is embodied in a bill now pending, to grant an American register to the steamship *China*, of the Pacific Mail Company, may be carried out not only in this, but in all similar cases, by means of which American owners of foreign-built steamships, whose high qualities are such as to make them a desirable acquisition, may be permitted to obtain an American register upon condition that vessels of equal size and of equal tonnage shall be ordered to be built in the United States.

With reference to unprotected cruisers of the second class, of from 4,000 to 5,000 tons displacement, the Department does not recommend any present increase of the number. These vessels, in order to attain the high speed required of a cruiser, must necessarily sacrifice coal endurance, and they have therefore a very restricted sphere of usefulness for cruising purposes in time of war. They answer satisfactorily the limited demand for flagships upon regular stations in time of peace, but it is not upon these vessels that the United States would place reliance in case of attack from a maritime power. Nor is it desirable to add to the number of heavily armed gunboats of the *Yorktown* type which we now have in the service. It may be that a type of cruiser can be reached of from 2,000 to 3,000 tons displacement armed entirely with rapid-fire guns and of great speed, which will have sufficient coal endurance to be utilized at great distances, but until this type is more fully developed it is undesirable to advance in that direction.

One well-defined type, which has proved highly successful, is that of a torpedo cruiser of from 800 to 1,000 tons, of small size, of light draft, a speed of 22 knots, sufficient coal capacity, rapid-fire guns, and powerful torpedo armament. This, as stated in my report last year, is the type of vessel that the Department would suggest building and that Congress adopt its recommendation to increase the limit of cost

in the vessel authorized by the act of June 30, 1890, and several such vessels would be a valuable addition to the naval force, both in peace and war.

I would here renew the recommendation made last year for the building of four small vessels of special design for river service. During the past year affairs in the east have been quiet, but disturbances may be again expected in the near future. One of our vessels in these waters has lately been condemned and ordered to be sold, and another, the *Monocacy*, is in such condition that her early condemnation and sale is probable. The necessity for these vessels, recommended last year, will undoubtedly arise and become urgent before the vessels can be built, and it is the firm belief of the Department that no time should be lost in undertaking them. They should be of about 1,200 tons displacement, with a speed of 17 knots, a maximum draft of 9 feet, a battery of rapid-fire guns and a number of revolving cannon and machine guns. They will be inexpensive vessels, well adapted for the service, and so constructed as to last for a long time. The general conditions of the design required have already been considered in the Department and, although they represent a great advance on anything hitherto employed for this service, they present no peculiar difficulties in construction, while their light draft would permit of their being built on our inland waters.

I would also renew the recommendation previously made for the building of torpedo boats. A supply of American torpedoes is now at hand and the United States can not afford to be any longer destitute of the boats specially adapted for their use. The following table shows the comparative situation of the principal maritime States in the matter of torpedo boats, and the position occupied by the United States in the list:

Nation.	Number of boats.		Increase.
	1889.	1892.	
France.....	191	248	57
England.....	207	208	1
Italy.....	128	185	57
Germany.....	98	180	82
Russia.....	122	168	30
China.....	26	69	43
Austria.....	60	65	5
Holland.....	16	63	47
Greece.....	51	51	.....
Norway and Sweden.....	19	35	16
Denmark.....	22	34	12
Turkey.....	29	32	3
Japan.....	21	29	8
Brazil.....	115	18	3
Spain.....	15	18	3
United States.....	1	2	1

At least 30 such boats should be constructed in the immediate future. It is to be hoped that in their construction, as in that of Torpedo Boat No. 2, now building at Dubuque, Iowa, the resources of the interior will be drawn upon to a considerable extent,

Although the Government and people of the United States have reason to congratulate themselves upon the marvelous progress which the mechanical skill of America has enabled them to make in the reconstruction of their Navy, it must not be supposed that the work has been completed. While our progress, from the fact that it proceeded from a small beginning—almost, it might be said, from nothing—has been startlingly rapid and successful, other nations building upon well-established foundations have not been idle, and the United States is by no means yet in a condition of adequate defense.

In the meantime the aggressive policy of foreign nations, evidences of which have been pointed out in my previous reports, has continued, and this country, whether it will or not, will soon be forced into a position where it can not disregard measures which form a standing menace to its prosperity and security. On the Isthmus our commerce is engaged in a desperate fight to maintain its foothold. In the South Pacific repeated annexations and protectorates are extending the power and influence of the maritime states of the Old World. Subsidized lines of fast steamers are completing the circle of maritime communication on the eastern and western coasts of the Dominion of Canada, and fortresses daily increasing in strength are surrounding our coast upon the south and the east. Under these circumstances it is imperative to the welfare of this country that the policy of naval reconstruction so successfully carried on in the past should suffer no interruption in the future; that the vast numbers of skilled artisans who have been trained in its workshops, and in those of private manufacturers concerned in its operations, should not be thrown out of employment; that the work, whose chief difficulties have now been overcome, should not be suffered to languish when every day shows an improvement both in economy and in dispatch; and that with only two vessels remaining on the stocks, as will shortly be the case, some further additions should be made by Congress at the present session.

#### SHIPS IN COMMISSION.

During the past year all the available vessels of the Navy have been actively employed and have performed an exceptional amount of cruising at sea. The squadron on the North Atlantic station, under Rear-Admiral Gherardi, made the usual cruise in the West Indies during early winter. In January, Admiral Gherardi was ordered, with the *Delphia* and *Concord*, to Montevideo. Upon their return in the part of February the squadron cruised until May in the West coming north in June. In September Admiral Gherardi, having dered to take command of a squadron for special service, was



succeeded by Admiral Walker. Shortly after, the *Chicago*, *Concord*, and *Kearsarge* were sent to Venezuela, whence, after two months of service, the *Chicago* and *Concord* returned to the United States.

In October, 1891, the *Boston* and *Yorktown* were detached from the Squadron of Evolution and sent to the Pacific. The *Chicago*, *Atlanta*, and *Bennington*, under Admiral Walker, were ordered in December to Montevideo, where they arrived January 10, 1892. The squadron remained in the river Plate, visiting Buenos Ayres during their stay, until April 27, when the *Chicago* and *Atlanta* were ordered home, arriving in the latter part of May. The *Bennington* remained on the station. During the summer the squadron took part in the drills of the naval militia, and on September 9 it was merged in the North Atlantic Squadron.

On September 22, 1892, Admiral Gherardi assumed command at San Francisco of a squadron for special service, composed of the *San Francisco*, *Charleston*, *Baltimore*, *Boston*, and *Yorktown*. This squadron, with the exception of the *Boston*, which remains at Honolulu, is now cruising down the coast of Central and South America. It is under instructions to make a visit to all important points on the west coast, as an evidence of the friendly feelings of the United States toward those nations. It is expected that such of the vessels as can be spared will, in the course of the next two months, pass through the straits and make similar visits at important points on the east coast, subsequently joining the North Atlantic squadron, to which will be assigned the duty of taking part, under the command of Admiral Gherardi, in the naval review directed by the act of Congress of April 25, 1890.

The *Essex* and *Yantic* are now on the South Atlantic station. It had been intended to send the *Newark*, under Admiral Benham, as the flagship of that station, but the vessel was required for service in the Mediterranean. Here she was joined by the *Bennington*, and the two vessels took part in the celebrations in honor of Columbus at Palos in August and again in October, and at Genoa in September. Both vessels will return to the United States in time to take part in the review.

The Pacific squadron is still under the command of Admiral Brown, and is composed of the *Mohican* (flagship), *Boston*, *Alliance*, *Adams*, *Ranger*, and *Thetis*. The *Alliance* is now on her way to Samoa, and the *Adams* has remained in Bering Sea to protect the seal islands until the present month, when she returns to her station.

Admiral Belknap was succeeded on the Asiatic Station by Admiral Harmony February 20, 1892. The vessels on the station are the *Lancaster* (flagship), *Marion*, *Monocacy*, *Petrel*, and *Palos*. The *Palos*, having been condemned as unfit for further service, has been ordered to be sold. Matters on this station are more quiet than during the preceding year.

The survey for a telegraphic cable between California and the

**Hawaiian Islands** was begun by the *Albatross* in September, 1891, and completed by the *Thetis* in May last. The *Pinta* has continued on special service in Alaskan waters, and the *Michigan* on the lakes. The training squadron has made a short cruise in the West Indies and Europe. The *Constellation* sailed for Naples October 6, for the purpose of bringing over works of art for the World's Columbian Exposition.

#### NAVAL REVIEW.

Under an act approved April 25, 1890, Congress provided—

That the President is hereby empowered and directed to hold a naval review in New York Harbor in April, 1893, and to extend to foreign nations an invitation to send ships of war to join the U. S. Navy in rendezvous at Hampton Roads and proceed thence to said review.

The naval appropriation act of July 19, 1892, authorized the temporary enlistment and use for the review of seamen in addition to the regular number of enlisted men, and the construction in Spain of reproductions of two of the caravels of Columbus. In pursuance of these acts the Department, for some time past, has been engaged in preparations for the review, and the date of April 26, 1893, has been fixed for the rendezvous at Hampton Roads. Invitations to take part have been sent to all the maritime nations. The number of responses thus far received indicates that the review will be by far the most important assemblage of naval vessels that has ever taken place in the waters of America.

All available ships will be concentrated for the review, and strenuous efforts are being made to hasten the completion and commission of new vessels to take part in the celebration, and it is believed that as many as fifteen of these vessels will be included in the contingent of the United States.

The two caravels have been nearly completed and will be present at the review. A third caravel, a duplicate of the largest vessel of Columbus, the *Santa Maria*, has been constructed by the Spanish Government, which contemplates sending her over to join with her consorts in the celebration.

The necessity of further provision for the expenses of the naval review will be the subject of an early communication to Congress.

#### OPERATIONS IN BERING SEA.

For the purpose of carrying out the convention dated April 18, 1892, *a modus vivendi*, in reference to the taking of seals, the Department, the 25th of the same month, designated Commander R. D. Evans to the command of a fleet of vessels to cruise in and about Bering Sea. The fleet consisted of the *Yorktown*, *Mohican*, *Adams*, and *Ranger*, and revenue cutters *Corwin*, *Rush*, and *Bear*, which last were placed, in the direction of the Secretary of the Treasury, under the orders of the officer in general command.

The fleet assembled at Port Townsend, and the *Yorktown*, *Mohican*, *Adams*, and *Rush* sailed for Bering Sea on the 13th of May. The *Ranger* followed on May 21, and the *Corwin* on May 27. The *Bear* was then on a cruise in Bering Sea, and joined the fleet later. The orders of the Department were stringent and directed the commanding officer of the fleet to warn all American and British vessels found outside Bering Sea not to enter its waters for the purpose of sealing; to seize all vessels found to be or to have been employed in sealing within the prohibited waters whether with or without warning, and all vessels found therein, whether warned or not, having on board implements for taking seals, or seal skins, or bodies of seals.

These orders were fully carried out. The sealing fleet in May consisted of 105 vessels at sea, British and American, of which 98 were boarded and warned. During the summer the fleet was actively cruising in Bering Sea and succeeded in capturing every sealer that entered the sea. The total number of seal skins taken by poachers in the sea was 467, all of which were recovered. The vessels of the fleet cruised altogether 63,000 miles from May 13 to October 1.

In pursuance of the Department's order and of the judicious dispositions made by Commander Evans for its execution, the supply steamer *Coquitlan*, carrying stores for the sealing fleet, and used as a transport steamer to convey their skins to Victoria, was captured at Port Etches by the revenue cutter *Corwin* while engaged in receiving on board skins from the sealers, in violation of sections 2867 and 2868 of the Revised Statutes. This capture virtually broke up the operations of the larger vessels of the sealing fleet. Two sealers, the *Winifred* and the *Henrietta*, which had also been guilty of a violation of the same statutes, were captured in Bering Sea in the act of taking seal, and sent to Sitka for condemnation.

The service rendered by the revenue cutters during the operations in Bering Sea was of great value and importance, and it is a source of pleasure to the Department to quote the following statement of Commander Evans in his report of October 12, 1892, upon this subject:

"Regarding the revenue cutters and the officers of that service under my command during the past six months I have only words of commendation for them. The officers were zealous and efficient and their ships beautifully kept and at all times ready for service, and I have to commend them as a body for the excellent work they did."

The Department also desires here to record its appreciation of the judgment, energy, and skill with which Commander Evans performed the difficult duties assigned to him in the command of the United States naval force in Bering Sea. It may be added that the marked improvement in the results accomplished by the force during the past summer over those of the previous year was in a great measure due to the fact that the whole force was placed under a single naval commander.

## QUARANTINE AGAINST CHOLERA.

On September 1, 1892, a circular was issued by the Treasury Department, with the approval of the President, imposing certain quarantine restrictions upon incoming vessels for the prevention of the introduction of cholera. Three days later the commandant of the New York navy-yard was directed to give the collector of the port such aid as he might need in preventing vessels in quarantine from unauthorized communication with the shore, or with other vessels, and preparations were at once set on foot to carry out the order.

In compliance with a request to that effect, on September 7 the Department directed the commandant of the navy-yard to send a tug into Long Island Sound to patrol the waters near Willets Point, and to detain all vessels coming from foreign ports until released by proper permits from the local authorities. Before nightfall of that day the tug *Narketa* was at her station, and remained there until September 17, when she was relieved by another navy-yard tug, the *Catalpa*, which continued to perform this service until September 24. During the time that these tugs were on duty no vessels coming from foreign ports through the sound were permitted to pass them; all were required to anchor, and their crews and pilots quarantined until released by the health officer.

On the 8th of September the commandant was directed to turn over the *New Hampshire* to the health authorities of New York, and on the next day, at the request of the health officer, she was towed to the docks of the Hamburg-American Steamship Company at Hoboken, and delivered to the company, to be fitted up by them for quarantine service in the lower bay. The vessel was returned to the Government on October 22.

On the 10th of September orders were issued to marine headquarters to send two companies of marines to the camp of refuge at Sandy Hook for temporary guard duty. The commandant at New York was directed to render such assistance as might be necessary. In compliance with these orders, Commodore Erben on the same day detailed a force of 45 marines for this purpose, and on the following morning the detachment was sent to Sandy Hook with five days' rations and 1,350 rounds of ammunition. Additions were made to the force on the following days to the total number of 10 officers and 200 men. On October 5, the object of the camp having been accomplished, it was broken up, and the men returned to their several stations.

A noticeable feature of the employment of the marines at Sandy Hook was the promptness with which the detachments were mobilized. One hour after the receipt of the telegraphic order from Washington the Boston detachment had left their barracks en route for New York, while that from Washington was ready to move forty minutes after the instructions were given. When it was apparent that an additional

force would be required, further orders were sent by telegraph at 3 p. m. on the 15th, to the navy-yards at Boston, League Island, Norfolk, Washington, and Annapolis for detachments to assemble at New York as a reinforcement. The next morning the commandant at New York reported the arrival of the detachments from all the stations in heavy marching order and ready for immediate duty.

On the 13th of September, at the request of the governor of New York, the Department directed the commandant of the navy-yard to render every assistance to the first battalion of the naval militia of the State of New York to enable them to proceed to Fire Island, properly equipped for the service. They were immediately furnished with steam launches, boarding cutters, arms, ammunition, and equipments.

On September 19, in order to facilitate the work of the quarantine authorities, the monitor *Nantucket* was put in commission for temporary duty as a depot ship, and proceeded to the lower bay with two launches, for patrol duty. This duty continued until October 6, when the *Nantucket* and the launches returned to the yard.

It is believed that the measures of assistance described above contributed materially to the effective quarantine maintained in the port of New York.

Upon the request of the Treasury Department for the loan of the *Jamestown* for use at the quarantine anchorage near Fisherman's Island, in Chesapeake Bay, orders were issued on September 7 to prepare the vessel immediately for the service required, and on the 9th the *Jamestown* was turned over to a representative of the Marine Hospital Service. The vessel is still in the possession of the Treasury Department.

#### AFFAIR OF THE BALTIMORE.

The circumstances of the attack at Valparaiso upon the seamen of the *Baltimore* were described in the last annual report, and the statements then made were confirmed by the examination in the following January, at Mare Island, Cal., conducted by the Judge-Advocate-General before the United States commissioner.

The Chilean Government, in fulfillment of a voluntary offer of indemnity for the injuries to the sailors of the *Baltimore*, has transmitted to the United States a draft for \$75,000 to be devoted to this purpose. As soon as the proceeds of this draft shall be received a board will be appointed to ascertain the proportion of the relief to which each of the sufferers is entitled.

#### PERSONNEL.

In the annual report of last year the Department presented certain important considerations with reference to the report of the Plythian board upon the subject of promotion in the line of the Navy. It is not necessary to reiterate here the views then expressed with reference to

the condition of the naval personnel. The problem of reorganization is yearly becoming more pressing, and delay in action renders it more difficult of solution. It is clearly impossible to deal adequately with the subject in its reference to only one branch of the service, and I therefore recommend that it be referred to a Congressional commission, empowered to deal with the question as a whole, and that the various measures proposed for reorganization of the service, or any part of it, be considered by this commission. By this means Congressional action will rest upon the broad basis of the requirements of the whole Navy, instead of consisting of fragmentary reforms affecting only this or that branch of the service.

In addition to the above I would urge the passage of legislation at this session, as an act of justice to the whole service, which shall give to the Navy the benefit of the laws long applied to the Army, by which an officer may retire after thirty years' service on his own application in the discretion of the President, and shall be allowed commutation for quarters where no quarters are provided.

#### NAVAL CONSTRUCTORS.

The Department, in referring to the extent and character of the work done by the Bureau of Construction in the rebuilding of the Navy, desires to call special attention to the important assistance rendered by the young constructors of the Navy. As far back as 1879 it was wisely decided, in view of the great changes taking place in naval architecture, in which this country had borne no part, to select from the most promising graduates of the Naval Academy a few each year who could, under the liberal arrangement made by certain foreign governments, acquire a complete professional training in modern naval construction at the best schools in the world.

Eighty-five per cent of the maximum mark for the four years' course was fixed as the lowest limit for candidates for this special training. The students have been assigned to the various schools at Greenwich, Paris, and Glasgow, and have had additional advantages for the observation of practical work at public and private establishments, which have shown the utmost desire to furnish all possible facilities to the United States constructors. The work performed by these students, under the supervision of the naval attachés, as indicated by their standing at the institutions they have attended, has been in the highest degree successful. The small amount which the Government has expended in their education has been returned to it fifty-fold by the zeal, industry, and knowledge which they have brought to the service, and which have contributed materially to the economy and perfection of the work shown in the work.

Under the existing law the Chief of the Bureau of Construction can only select from an officer of the grade of commander or above. This provision in the law restricts the choice to five officers, a number far

lower than in the case of any other chief of a bureau. I recommend that the law be so amended as to make all full naval constructors eligible to appointment.

#### ENLISTED MEN.

The condition of the enlisted men has been referred to in my previous annual reports, especially that of 1889, where the subject received full discussion. In pursuance of a recommendation then made a bill was introduced in Congress at the last session, which was favorably reported in the House and still awaits action, providing that the number of apprentices be increased from 750, as now allowed by law, to 1,500. It is hoped for the good of the service that this bill may be passed at the coming session. The measures proposed three years ago for the purpose of securing a more permanent class in the corps of enlisted men are again recommended, and it is urged that the principle be adopted of retaining the services of men for life by a plan of permanent enlistment. If the present system continues, the Department believes that a term of enlistment of at least four years should be adopted, and recommends that the laws relating to honorable discharges after three years' service and to allowances upon a three years' reenlistment be amended accordingly.

#### NAVAL MILITIA.

In my first and second annual reports attention was called to the importance of a trained militia for the Navy and the advantages that would result from such an organization, both to the regular service and to the country at large. In the second of these reports it was recommended that an appropriation should be made by Congress for the supply of arms, in the same manner as had been done for many years for the land militia. It was believed that nothing further was necessary to lead to the rapid creation of a force of naval militia in the seacoast States. In pursuance of this recommendation Congress has since made an annual appropriation of \$25,000 for the purchase of arms for the naval militia of the several States, to be expended "under such regulations as the Secretary of the Navy may prescribe."

The regulation governing the distribution of the appropriation during the past year was as follows:

WASHINGTON, D. C., *August 23, 1892.*

Under the authority conferred by the naval appropriation act approved July 19, 1892, in the following terms: "Naval Militia: For arms and equipment connected therewith for naval militia of various States, under such regulations as the Secretary of the Navy may prescribe, twenty-five thousand dollars," the following regulations are prescribed:

(1) Returns will be made by the governor of each State having a naval militia, before the 15th of October next, to the Navy Department, certifying to the number of men actually mustered in and serving in the naval militia of said State on the

**1st of October, 1892.** No person serving in any capacity in the land militia will be included in this return. Upon the receipt of these returns the Secretary of the Navy will allot to each State a proportionate part of the sum of \$20,000, according to the proportion which the number returned from each State bears to the total number returned by all the States.

2 The balance of the appropriation, amounting to \$5,000 will be reserved until December 1, 1892, to be then apportioned among those States whose naval militia (or a detachment thereof) have actually drilled on board a vessel-of-war for a period of not less than four consecutive days at some time between June 1 and December 1, 1892, to be distributed in the proportion which the detachment so drilled from each State bears to the whole number so drilled from all the States; but applications for such drills from States whose detachments have not already participated therein, in order to entitle them to this advantage, must reach the Navy Department not later than October 15, 1892.

(3) As soon as the allotments are made, in accordance with the above regulations, the amounts allotted will be credited to the States entitled thereto on the books of the Navy Department.

(4) Requisitions for arms and equipments will be made by the governors of States direct to the Secretary of the Navy, who will determine and order which of such arms and equipments, their number and character, shall be issued.

(5) When a requisition is received at the Navy Department the Bureau concerned will be required to give the money value of the stores called for, and the Navy Department will determine and order which of said stores, their number and character, shall be issued.

(6) All property issued upon requisition shall be accounted for under the regulations which now govern the accountability for public property in the Navy, and the Navy Department will issue the necessary instructions for the safe-keeping, preservation, inspection, and accountability thereof.

(7) The Navy Department will furnish the governors of the several States possessing a naval militia force with the necessary blank forms to carry out the provisions of the above sections. All returns should be made to the Secretary of the Navy.

The number of men certified as mustered in and serving in the naval militia under this circular is as follows:

State.	Officers.	Party adjutant.	Enlisted men.	Total.
Rhode Island .....	3	2	67	72
Maryland .....	21	25	72	118
South Carolina .....	22	2	127	151
North Carolina .....	2	6	12	20
Massachusetts .....	10	1	60	71
California .....	2	1	24	27
New York .....	2	2	14	18
Total .....	62	39	376	477

Since the receipt of the official return for the current year, as above, a battalion has been organized in Pennsylvania, and accepted by the State authorities under the provisions of the statute providing therefor. The return is expected to show the militia forces of this State, both for land and naval militia, and gives an assurance that the naval militia will be organized. It is expected there will soon be among the provisions of the statute. The Department is also, and has been, in receipt of returns from



toward the formation of a naval militia at other points, notably at Chicago.

During the year the naval militia of Massachusetts has served its regular tour of duty on board ships in commission in Boston Harbor, of Rhode Island in Narragansett Bay, of New York off Gravesend, of North Carolina in Chesapeake Bay, and of California at San Francisco. All the detachments showed great zeal in the work, and remarkable proficiency in the various exercises, the target practice with heavy guns being especially satisfactory.

The creation of the naval militia is one of the most important steps in our recent naval progress. In 1889, although our small regular Army contained possibilities of indefinite expansion, owing to the militia behind it, the number of trained men that could be called upon for service in the Navy was absolutely restricted to the active force of little over eight thousand men. In the short space of three years a body of men has been organized, trained, and disciplined whose number is already equal to one-fourth of the regular service and is rapidly growing, while its efficiency has earned for it a high reputation in the localities where it exists.

#### REVENUE-MARINE SERVICE.

The Department again refers to its recommendation made for two successive years in favor of legislation consolidating the Revenue-Marine Service with the Navy. The advantages of this change have been fully stated in previous reports of Secretaries of the Navy, and it is not necessary to repeat them here.

A striking illustration of the feasibility and expediency of this change was given by the Bering Sea fleet during the past summer. The operations of the naval vessels and of the revenue cutters were far more efficient than those of last year, a result partly due to their union under one command. The two branches of the service worked together in perfect harmony. Four vessels of the Navy were united under the same command with three vessels of the Revenue-Marine Service, upon identical duties, pursued in the same manner and under a common commander-in-chief, who employed a naval vessel or a cutter without distinction in the execution of any orders of the Department.

The zeal and ability of the Revenue-Marine Service in the discharge of these duties called forth from Commander Evans, commanding the squadron, than whom no one was better able to judge, the highest praise, and form an additional ground for the renewal of my previous recommendations.

#### MARINE CORPS.

Attention is called to the recommendation of the Colonel Commandant of the Marine Corps in reference to the increase in the number of privates and noncommissioned officers in the corps. It is believed

that the number now appropriated for is not large enough for the prospective work of the corps during the coming year, and that the number required by the naval review and by the section of the "Naval Education" would it be practicable, in case an additional demand was made upon the corps, as happened during the past summer, to have the men for any length of time from the stations where they were performing important duties in protecting a large amount of Government property?

#### METHODS OF DEPARTMENTAL ADMINISTRATION.

The efforts of the Department during the past year have been directed to the development of ships and ordnance, and of general administrative subjects. Much thought and labor has been bestowed upon the improvement of departmental administration, and, though a large amount of time and energy was required in this respect for the sake of attaining efficiency in every branch of operation, new measures have been adopted which are calculated to accomplish the desired end.

A large number of these reforms and reforms, and several of them are deserving of special mention.

Under the system existing at the beginning of this administration, the Navy Department, while it had the supervision of great enterprises charged with them, the Bureau of Supplies, the Bureau of Materials, and many of whose operations were of self-contradictory nature, required concerted action, contained a large number of departments, and the details of administrative work. Not only did this system not exist, but the assignment of parts of the business of the Department to different bureaus had apparently been made with reference to the general purpose of the bureau or to placing under its control the details of work. Numerous instances have been given in previous reports of the disadvantages of this irrational assignment of duties. The office or detail, at whose head was the Chief of the Bureau of Navigation, was charged with the assignment of officers to duty, and to some extent the movements of ships in commission, while the Bureau was at the same time providing a supply of compasses, chronometers, electric lights,

optical instruments, ships' libraries, and other miscellaneous articles. The detailed administration of the other branch of the personnel, comprised in the enlistment and assignment of seamen, belonged to the Bureau of Equipment, which was also engaged in the supply of another branch of miscellaneous articles and in the manufacture of cordage, galleys, sails, and anchors. The Bureau of Ordnance, whose predominant duty was the supply of armaments, was charged with the direction of gunnery practice, and other equally unsuitable arrangements were presented by the existing distribution of departmental business.

Under the authority conferred by section 419 of the Revised Statutes, which provided that "the business of the Department of the Navy shall be distributed in such manner as the Secretary of the Navy may judge to be proper and expedient among the following bureaus,"

etc., a new distribution of certain branches of Navy Department business was made, by which the defects mentioned were remedied. The principal change consisted in placing under the supervision of the Bureau of Navigation matters relating to the movements of vessels, and the personnel of the Navy, including both officers and seamen. These arrangements relieved the Bureau of Equipment of duties in connection with enlisted men, and the branches of supply hitherto falling under Navigation were assigned to this Bureau, whose work had thus been curtailed. The business of electric lighting, which had been in part assumed by Ordnance and in part by Navigation, was concentrated under Equipment, and other changes were made, the general result of which was to place the charge of the personnel under the Bureau of Navigation, the business of supply and accounts under Provisions and Clothing, and the business of manufacture under the remaining bureaus.

At the same time a board was appointed composed of certain bureau chiefs, with the addition of the chief intelligence officer, to form a standing committee of advice in reference to questions arising in the design and construction of new ships. The work done by this board has been an indispensable element in the operations of the Department in the great labor involved in the recent construction.

The system governing the repairs of vessels has also been the subject of careful consideration and of marked improvement. Under the system formerly prevailing, the bureaus acted upon questions of the repair of vessels to a great extent independently, involving great loss of time and frequently waste of effort. In one case in particular, a vessel in commission, which the Department had ordered upon important service, was found, after the orders had been issued, to have been practically withdrawn from service without its knowledge by the undertaking of repairs upon bureau orders. In December, 1890, an order was issued by which the work of repair was systematized, and the operations of the bureaus connected with repairs of ships correlated under Departmental supervision. The small number of ships available, and the urgent service which has been required of them during the past two years, have made it impossible to derive the full benefit from the new system that will be found when ships requiring extensive repairs can be put out of commission for that purpose, and other ships can take their place; but even under the unfavorable conditions due to the exigencies of the service, the results of the new system have been of great importance, both as regards efficiency and economy of repairs.

By a regulation circular of March 22, 1892, the system of paying employés at the navy yards was revised and greatly simplified. The old system which had been in use for many years, consumed the time of employés during their hours of labor, and resulted in pecuniary loss to the Government. Careful investigation was made of the methods pursued in outside establishments, and experimental trials of the new system were made before its adoption, so that upon the issue of the

**ircular**, it went into easy operation. It has been proved by actual investigation that this change alone has saved the Government over \$50,000 a year in the expenditure for navy-yard work.

In view of the difficulties experienced by reason of the inferior quality of many commercial articles, whose composition could only be determined by chemical analysis, the Department has secured the services of a competent chemist to analyze all articles requiring chemical test, and to revise the specifications of such articles. The necessity of such service was immediately shown in the fact that one of the first deliveries upon which test was made was of a lot of white lead, delivered as pure, and of which 75 per cent consisted of impurities which could only be detected by analysis. The employment of this chemist has therefore resulted in very material saving to the Government in preventing the Department from being imposed upon by the delivery of inferior or adulterated articles.

Of all the changes in organization made by this administration, the most important is that which relates to the employment of labor at the navy-yards. The high character of work required of these establishments, both in construction and in repair, since the introduction of steel ships, called imperatively for the best class of mechanical labor. The fact was well known that under the system which had previously existed the selection of employ  s for navy-yard work had been governed largely, if not mainly, by political considerations. Workmen were chosen not only because they belonged to the party of the administration, but because they belonged to the faction of this or that boss of the local political machine who happened to be in favor. The appointment of workmen by foremen gave great facility for the application of this system, as all that was necessary was to appoint a foreman of the political stripe and the details of the business of selection could readily and simply arranged between the foremen and the local political organizations.

It is impossible to conceive of a system more demoralizing from a political standpoint or one which from a business standpoint could so thoroughly destroy the efficiency of the yards as manufacturing establishments. In the old days of wooden ships it was perhaps possible to conduct the yards under such a system without absolutely degrading the character of the work, although it must inevitably have involved a heavy expense. Since the introduction of steel ships, such a state of affairs could exist no longer, and it has remained for this administration by a series of new regulations to root it out at once and it is to be hoped forever.

In order that the changes required might be made without partiality, at the same time with a view to the best interests of the service, the Department in the spring of 1891 declared all foremanships at the navy-yards vacant and appointed a board of officers, all of whom were technically qualified, and three of whom had had long practical experience in the

direction of shop work, to ascertain the fitness of all applicants who might present themselves for the vacant positions, whether previous incumbents or not. The tests applied were entirely practical, having reference to the applicant's knowledge of his trade and his ability to fill the requirements of the place. No educational qualification was required, except that the man should be able to make the reports, estimates, and calculations essential to the proper conduct of the business. The board was directed in every case to name the man whom it considered best fitted for the place, and in every case the man recommended by the board as the best received the appointment.

The men obtained by these tests, which were applied at all the yards, showed a high order of excellence, and the work under their direction has steadily improved.

For the selection of workmen a board is established at each yard, composed of the captain of the yard and two of the officers of technical departments, who should act as a board of registration to classify all workmen who apply in their several trades and register them for certification to departments requiring workmen. Upon the receipt of requisitions from a department requiring men, the board is required to furnish them in the order in which they stand on the register; that is to say, in the order of their application. A fixed rule of priority, in accordance with the law, applies to veterans, especially in the selection of common laborers, and an equally fixed rule of priority applies to workmen with navy-yard experience. With these two classes, as with all others, the order of registration is strictly observed, and in no case is it possible under the regulations to give any preference to a man on account of his political or other affiliations. When a workman reports, the head of the department is required to give him a fair and impartial trial, and grade him according to his skill; or, if found incompetent, to reject him and notify the board, stating the reasons for the rejection, which thus become a matter of record. The board thereupon supplies new names as needed.

The board exercises no power of selection. The only test is the test of efficiency applied by the head of the department, and this can only be applied upon the men certified by the board.

As an illustration of the effect of the system it may be stated that Secretary Chandler, in his report for 1884, while declaring that the abolition of machine politics in navy-yards was desirable, stated that whatever might be done with the hulls of our new vessels, the engines could not be constructed in the yards until such a change was made. The same distinction was made by the Department in projecting the *Maine* and the *Texas*, whose hulls were ordered to be built in the navy-yards, but whose engines were let at private contract. The present administration, believing that such a reorganization could be perfected in the yards, and that they could then be safely intrusted with the building of the engines as well as of hulls, ordered the construction of

the machinery for the *Cincinnati* and the *Raleigh* at the New York yard. The result has amply justified the expectations of the Department. The work performed under this order has been of the highest finish and quality, and no doubt is now entertained of the capacity of our working yards to accomplish any task in the way of naval construction or repair.

In testimony to the sincerity and impartiality with which the Department has carried out its proposed change in the face of much opposition from those interested in the maintenance of the old system, both within and outside of the service, it may be stated that application was made in August last by the New York Civil Service Reform Association for permission to examine into the workings of the system by sending its own officers to the yard. Orders were given to the commandant to afford every facility in this investigation. A searching inquiry was held into the workings of the system on the spot, and an examination was made of the records of the board of labor employment, by which the history of every appointment could be fully ascertained, it having been one of the objects of the system to secure completeness and publicity of record in all its workings. As a result of this investigation the secretary of the association reports as follows, under date of October 11:

The first year of the operation of the merit system in the navy-yards ended September 1, and a summary of its results is a gratifying evidence of Secretary Tracy's experiment.

The record of the labor bureau at the Brooklyn yard shows a total of 3,750 men registered during the year in the eighty-four trades classified. Of these 1,111 were required. There were 1,479 certifications, but 387 failed to appear when sent for. Only 81 were rejected as incompetent. Each man producing the necessary certificate of good character and ability is registered in a numbered list, from which appointments are made invariably in the order of registration. In the event of his employment being for a short time only he is returned to his former place on the list when discharged and made reëligible in the same order.

Each permanent appointment has a period of two weeks' probation, at the end of which the workman is rated in one of four grades of ability, and he is promoted as the excellence of his work permits. The wages paid are determined quarterly after the sending of a circular of inquiry to employers throughout the country ascertaining the prices paid in similar grades and averaging wages at the yard on the same basis.

A rejection for incompetency or dismissal for other cause is made only after a consideration of the case by the superior officer of the foreman or quartermen suggesting the action.

The men now employed, numbering some 2,100, form a well-organized and well-drilled force—probably as efficient a body of workmen as the largest manufacturing establishments in the country possess.

Foremen, quartermen, and other superior officers, classified in Schedule C of Secretary Tracy's system, are appointed after a competitive examination conducted strictly lines and under rules that seem to have been consistently observed. The present condition of the work and conduct of the yard is of especial interest in view of the state of things in former "presidential years." The sixty-ninth article, prohibiting the employment of any workmen in excess of the number authorized on September 9, has been stringently observed. On the first of the sixty

days there were 2,100 men in the yard. A week ago the number was 2,038, and it is at present about 2,090. Early in August the total was 2,200. Even though additional men were appointed at this time on a plea of emergency, the manner of their selection would be the same as at other times—in the order of their standing on the eligible lists.

The following testimony to the good effects of the system is given by Commodore Henry Erben, the efficient commandant of the New York navy-yard, than whom no one is better able to judge:

In my opinion the system works admirably, its advantages being as follows:

(1) There is no favoritism in taking on men. When one is found incompetent he is discharged and another taken on, until a first-class workman is obtained.

(2) The foremen are not bothered by outside parties to give employment to friends, political or otherwise.

This enables the foremen and quartermen to be more independent of their men and hence better discipline is kept and better results obtained.

(3) The men do better work than under the old system, feeling themselves more independent, and knowing they will retain their places as long as the job lasts, and also that advancement in grade is open to them by continuous good conduct.

(4) THE GENERAL EFFECT OF THE SYSTEM HAS BEEN TO REDUCE THE COST OF ALL WORK DONE IN THE YARD DURING THE YEAR ABOUT 25 PER CENT.

That there may be objections to the working of the system I admit. I hardly see what system could be more perfect.

The only point objectionable is that when men have been registered for some time it is often difficult to reach them by postal card, owing to change of residence mostly. Time is lost, to be sure, but it is a question whether any private establishment could go into the labor market and get a first-class workman quicker than we can. This applies to certain workmen, such as bricklayers, leather-sewers, etc., who are seldom required, there being but few men in these trades employed.

Some of the heads of departments advocate the employment of their workmen by the head of the department. This might answer when only a few men were employed, *but the same objection would obtain as before, and favoritism in some shape might show itself.*

Complaints of partisan unfairness in the application of the rules, which have reached the Department from time to time, made by or on behalf of representatives of both political parties, have been fully investigated, and it has been shown in every case that the complaint was without foundation. In the latest case of this kind, where the naval constructor at Norfolk was charged with discrimination, a thorough inquiry was held and the investigating officer reports in reference to the naval constructor:

He has faithfully followed the law and strictly adhered to the regulations of the Department governing such matters, which are to my mind and experience the wisest and best that have ever been issued on the subject.

Under these rules the navy-yards have now been conducted for fifteen months. During these fifteen months occurred a Presidential campaign, the first within the memory of the present generation in which the yards have not been used as a political machine. In all Departments of labor and at all the yards the question whether a man was a Republican or a Democrat has been absolutely and totally ignored. The foremen, whether new or old, are to-day in every case the

foremen recommended by the Board, and the old had no advantage in the selection, for every foremanship was vacated before the selection was made. Not a workman has been taken on except in accordance with the rules, and, while in former Presidential campaigns the yards have been packed with voters, in the last no increase whatever took place during the sixty days before the election, nor was a workman employed beyond the normal number. The evidence of increased efficiency under this system is clear and unequivocal.

It is believed that no pretext can now be raised for a change in the working force upon a change of administration. If such a change occurs, for political reasons, it will mark a backward step in our naval administration, and will introduce anew into the yards the festering influence of political corruption. To preclude such a possibility, I recommend that the system now in operation, whose efficiency has been proved, be made permanent by suitable legislation.

The time has come when the Navy must cease to be the football of political parties. It has become a great national interest, which should receive the support of patriotic men, whatever their political faith.

It could not command this disinterested support as long as the taint of political favoritism hung about its workshops. When the Department first stated the policy which it proposed to carry out, it was denounced by those interested in maintaining the old system, the sincerity of its utterances was doubted, and there were few who believed that any practical results would be accomplished. To-day the policy outlined nearly two years ago is an accomplished fact, and its results are patent to all the world.

#### SUPPLIES AND ACCOUNTS.

One of the principal subjects that has occupied the attention of the Department during the past three years has been the perfecting and putting into practical operation of the improved system of purchase, supply, and accounts, the initial steps towards which were taken by my predecessor.

The main features of the system were the establishment at the yards the office of general storekeeper, to be filled by an officer of the pay, who was to be charged with the custody of all stores; the extension of the functions of the Bureau of Provisions and Clothing which to become the purchasing agency of the Navy; and the opening of a set of accounts both of stock and purchases in the Bureau.

At the beginning of the present administration, in March, 1889, all that had been actually accomplished was the bare transfer of stores to general storekeepers. Purchases were made as before, and only a few of the books at the storehouses had been opened. No ledger had been opened at the Bureau. Beyond the fact that the stores which were previously stowed away in the storehouses of the various bureaus, had in part been carted to the storehouses of the



storekeeper and there deposited, the system as yet existed only on paper. No arrangement of the stores had been attempted; no inventory having any pretensions to completeness had been taken; nor was it possible, at that date, to tell except by actual search whether any given description of supplies was on hand; or, if so, what was its amount or where it was to be found. The condition, both of stores and accounts, was one of extreme confusion, incident to the process of transition then going on, and considerable annoyance and delay were produced thereby.

So great were the difficulties of the situation, as they then appeared, that the question was even raised whether it was desirable to carry out the change. The advocates of the old system were numerous, comprising probably a majority of the service, and they were emphatic in their opposition to the new. Much fault was found with its details, the defects of which, however, have since then been generally remedied, either by modification or by additional experience in the new methods. Considerable pressure was brought upon the Department to induce it to abandon the project. It needed, however, but little inquiry to show the merits of the general principle of concentration, which any man with the slightest business experience knows is the only method under which the work of such an establishment can be carried on. The system was accordingly put into working operation.

From that time to the present efforts have been directed constantly toward the removal of difficulties in the plan of concentrating purchases and accounts and to perfecting its details. It is not necessary to describe in full the steps by which it has been converted into a thorough working system; hardly a week has passed, during the last three years, that some new device or modification or amplification of the rules has not been adopted tending to constant improvement. Inventories of stores have been completed, ledgers have been opened, a complete system of reports of expenditures and purchases of stock has been adopted. By the system of reports now maintained in the office of the Paymaster-General the Department can obtain information at any time, not only as to what articles are on hand for general issue, but as to their number, kinds, and sizes, and the place where they may be found.

In carrying out this system daily reports are made of expenditures from the general stock, of purchases, of shipments, and of purchased articles whose delivery is overdue. In fact the office of the Paymaster-General, rightly named the Bureau of Supplies and Accounts, has become an office where every detail of the business of supplies, purchases, disbursements, accounts, custody of stores, issues, shipments, fitting out of ships, inspection, surveys and appraisals is conducted. The advantage of a change from the system where these matters were handled independently by eight different bureaus is apparent of itself.

It was found, however, that the mere concentration of financial business in a single bureau could not effect the desired result of causing

the manufacturing bureaus to utilize the stock of accumulated stores, the reduction of which was one of the main objects of the system. The bureaus, rather than draw upon the old stock, preferred to continue their purchases and so increase their accumulations. A system of voluntary transfer requisitions was introduced, but neither the party requiring supplies nor the party who had them in possession was disposed to make use of it. As each bureau controlled the disposition of its stock, although it was in the custody and on the books of the general storekeeper, the system at this stage was not unlike that of a number of independent firms doing business through a common warehouse. As a necessary remedy, the Department proposed, and Congress enacted, in the act of June 30, 1890, that all supplies purchased thereafter should be considered as purchased for the Navy, and not for the separate bureaus.

The benefits of this legislation were felt immediately. Prior to its passage there had been a constant yearly increase in accumulated stores, indicating purchases in excess of the needs of the bureaus, and indicating also that by the processes of bureau administration the stores thus purchased, after being locked up by the storekeeper for custody and inventoried for use, were kept locked up by the various agencies of bureau administration, without ever being used by the bureaus themselves, or permitted to be used by others. Under the new law, the bureaus had no object in hoarding, and if they attempted it at all, it was useless, for they only hoarded for a general pool. Reductions immediately began in the general stock. Stores which were lying concealed in storehouses, whose existence hardly was known, have been found, classified, arranged, and consumed. Useful supplies have been used, and useless supplies have been disposed of, and the proceeds covered into the Treasury. The consumption of old stock in the last two years has amounted to over one million dollars. A large part of the stock so utilized has gone into the work of building new ships, and has reduced by so much the drafts upon the provision made by Congress for the completion of the new Navy.

A further advantage of the concentration of the business of supplies and accounts lies in the fact that it is thereby possible to exercise better control and supervision over the methods of purchase. The contracts made during the year by the bureau, after public advertisement, numbered 891. They were awarded to 388 separate and distinct bidders, and the bids received for the articles embraced therein numbered

185.

Although the statutes provide that, in cases of exigency, supplies may be purchased in open market without advertising, and that certain classes of supply are expressly exempt from advertisement, it has been the aim of the Department to reduce, as far as possible, the number of these purchases in open market. It is therefore gratifying to be able to state that, although the large operations of the past year

involved disbursements 40 per cent in excess of those of the previous year, and although the course of events created an exigency more imperious than any that has been imposed upon the Department for twenty years, the amount of these exigency purchases during the year in question was \$70,000 below that of the year before. Such a result could only have been accomplished by a careful and conscientious execution of the repeated instructions of the Department that all purchases, wherever possible, should be made after public invitation of proposals from competing dealers.

One important point remains in which legislation is required to perfect the present system. Among the many and various articles required by the Navy are certain classes of supplies of an ordinary commercial character which are needed at all times. When these articles are needed they are urgently needed; if they are not on hand they can not be advertised for, for want of time, and even when bought without advertisement the necessary delays incident to even a purchase in open market are a source of constant annoyance, an obstruction to business, and an obstacle to the prompt and efficient management of the establishment. These urgent necessities arise daily, both in the running of ships and in the various processes of manufacture. Ships have often been detained and pressing work delayed by the want of some simple article which should be kept in stock. To prevent these inconveniences, which are nearly always a source of expense, it is recommended that a fund be created by Congress, to be known as "the supply fund," out of which ordinary commercial articles may be purchased on requisitions originated by general storekeepers in accordance with known demands at their station and approved by the Paymaster-General, such supplies when issued to the different departments to be charged against the proper appropriation and the fund reimbursed, and in that way kept intact. This would not entail any expenditure in excess of the regular appropriation. It would prevent detention of ships needed for immediate service, and delays of work which the workmen are waiting to continue, and would enable the purchase beforehand, under advertisement, of the greater part of the supplies now necessarily procured in open market upon emergency requisitions.

#### NAVAL WAR COLLEGE.

The Naval War College and Torpedo School has been reopened in the new building constructed for the purpose, the session beginning on the 6th of September, the course embracing a variety of subjects dealing with the conduct and art of naval war. Owing to the requirements of service elsewhere, the expected coöperation could not be given by the fleet. The courses of lectures were extremely full and successful, including the following: Naval History, Naval Strategy, The Ram and its Tactics, The Gun and its Tactics, The Torpedo in Naval Warfare, The Strategic Features of the Pacific, Armor for War Ships, Applica-

of Electricity to Naval Warfare, Naval Lessons of the Recent Naval War in Chile, the Nicaragua Canal, Naval Hygiene, Engines, Speed, and Coal Endurance of Modern Ships of War, The Designing of War Ships, Speed Trials and Coast Defenses.

The Department is deeply impressed with the importance of the college to the Navy as a means for insuring the development of the science of naval warfare, as distinguished from the development of naval material. Both are essential to the full attainment of the results to be expected from a Navy. The success of the college in the past has been recognized both in this country and abroad, and its usefulness may be expected to increase in the future.

#### NAVAL OBSERVATORY.

This establishment is remarkable among national observatories for the excellence of its site and the beauty and convenience of its buildings, and is exceeded by few in the richness of its material outfit. Its approach to completion has excited such wide interest both at home and abroad that the credit of the nation is deeply involved in securing for it a position in the scientific world corresponding to the magnitude of the sums which have been expended in its construction. The question of its proper organization is therefore again commended to the serious consideration of Congress. I have seen nothing to invalidate the opinion expressed in my last annual report, that the attainment of the ends for which the observatory was built requires that its work be directed by the best scientific talent that the Department can command, and that it be directed by the ablest astronomer who will undertake the duty. This policy is sustained both by the instinct of the practical mind and by that universal experience which has led every other nation possessing a great observatory to adopt it. It is especially urgent at the present time owing to the necessity of beginning work at the new establishment on comprehensive and well-considered plans, founded on a careful review of the problems of astronomical science now awaiting solution. There is reason to apprehend that the absence of such a plan detracted materially from the value of the work done at the old Observatory, and at the new one such a defect will be conspicuous and injurious to its reputation in proportion to the greatness of the substitution.

The revolution which the last thirty years have witnessed in the requirements of marine warfare on the one hand, and in the methods and objects of astronomical research on the other, have quite severed the connection between the naval and the astronomical professions, and led to placing the old observatory under the direction of a naval officer, regarding it as a naval station; and the professional attainments exacted of our officers and necessary to their efficiency involve a wide range of subjects and extend to such minute details that they have no time to devote to matters so far outside the line of

their profession as those to which pertain to the management of a great modern astronomical observatory.

#### ESTIMATES AND APPROPRIATIONS.

The estimates for the fiscal year ending June 30, 1894, for the Navy and the Marine Corps, including those for public works and for increase of the Navy, amount to \$24,471,498.21, being \$2,713,141.59 less than those for the fiscal year ending June 30, 1893.

The estimates for the running expenses of the Navy and the Marine Corps, for the fiscal year ending June 30, 1894, amount to \$14,767,841.21, being \$135,943.59 less than the estimates for the fiscal year ending June 30, 1893.

The estimates for the increase of the Navy amount to \$9,703,657 for the fiscal year ending June 30, 1894, and are \$2,577,198 less than those for the fiscal year ending June 30, 1893.

#### *Comparative exhibit of estimates and appropriations 1893 and 1894.*

Detailed objects of expenditure and explanation.	Estimates, 1893.	Appropriations, 1893 (current year).	Estimates, 1894.
<b>General establishment:</b>			
Pay of the Navy.....	\$7,350,000.00	\$7,300,000.00	\$7,300,000.00
Pay miscellaneous.....	240,000.00	240,000.00	240,000.00
Contingent Navy.....	7,000.00	7,000.00	7,000.00
<b>Bureau of Yards and Docks:</b>			
Ordinary expenses.....	418,794.04	376,595.69	509,453.14
Public works.....	759,659.38	588,900.00	757,083.00
<b>Bureau of Navigation:</b>			
Ordinary expenses.....	131,750.00	116,000.00	163,750.00
Naval Academy.....	207,688.65	189,065.45	219,488.65
Bureau of Equipment.....	1,034,225.00	956,025.00	956,025.00
Bureau of Ordnance.....	504,041.25	329,824.00	429,324.00
Bureau of Construction.....	1,019,972.50	969,972.50	969,972.50
Bureau of Steam Engineering.....	763,105.00	687,900.00	739,900.00
Bureau of Supplies and Accounts.....	1,232,692.03	1,197,532.03	1,273,892.03
Bureau of Medicine and Surgery.....	125,000.00	120,000.00	125,000.00
<b>Marine Corps:</b>			
Pay department.....	696,625.00	687,540.85	713,466.63
Quartermaster's Department.....	263,906.28	249,411.13	286,383.28
Naval Observatory.....	59,325.67	17,500.00	16,500.00
Naval Review.....		50,000.00	
<b>Total running expenses.....</b>	<b>14,903,784.80</b>	<b>14,083,266.65</b>	<b>14,767,841.21</b>
<b>Increase, Navy:</b>			
Bureau of Yards and Docks.....	110,000.00	60,000.00	
Bureau of Equipment.....	600,000.00	400,000.00	555,305.00
Bureau of Ordnance.....	4,188,250.00	2,000,000.00	2,000,000.00
Construction and machinery.....	7,384,605.00	7,000,000.00	7,148,352.00
<b>Total increase, Navy.....</b>	<b>12,280,855.00</b>	<b>9,460,000.00</b>	<b>9,703,657.00</b>
<b>Grand total.....</b>	<b>27,184,639.80</b>	<b>23,543,266.65</b>	<b>24,471,498.21</b>

*Appropriations, expenditures, and balances, fiscal year ending June 30, 1892.*

	Appropriations for fiscal year ending June 30, 1892.	Amount drawn fiscal year ending June 30, 1892.	Balances un- drawn June 30, 1892.	Balances undrawn October 31, 1892.
<b>Pay of the Navy</b> .....	\$7,300,000.00	\$5,641,853.12	\$1,658,146.88	\$821,959.17
<b>Pay, miscellaneous</b> .....	240,000.00	239,072.95	927.05	99.60
<b>Contingent, Navy</b> .....	7,000.00	846.54	6,153.46	.....
<b>Marine Corps:</b>				
<b>Pay</b> .....	696,296.28	579,028.60	117,267.68	83,996.65
<b>Provisions</b> .....	69,299.64	69,299.64	.....	.....
<b>Clothing</b> .....	75,000.00	75,000.00	.....	2,572.34
<b>Fuel</b> .....	23,000.00	18,000.00	5,000.00	5,347.88
<b>Military stores</b> .....	17,010.50	16,273.01	737.49	742.64
<b>Transportation and recruiting</b> .....	15,000.00	12,155.85	2,844.15	2,616.13
<b>Repairs of barracks</b> .....	14,300.00	14,265.51	34.49	34.49
<b>Forage</b> .....	3,500.00	3,000.03	499.97	511.72
<b>Hire of quarters</b> .....	6,624.00	6,624.00	.....	1.60
<b>Contingent</b> .....	30,500.00	30,413.49	86.51	147.38
<b>Naval Academy:</b>				
<b>Pay</b> .....	104,273.45	104,206.40	67.05	111.51
<b>Special course</b> .....	5,000.00	1,803.34	3,196.66	2,739.48
<b>Repairs</b> .....	21,000.00	17,759.77	3,240.23	2,371.14
<b>Heating and lighting</b> .....	17,000.00	16,594.75	405.25	149.90
<b>Contingent</b> .....	41,800.00	37,163.40	4,636.60	2,575.43
<b>Navigation:</b>				
<b>Transportation, recruiting and     contingent</b> .....	45,000.00	31,731.07	13,268.93	3,130.00
<b>Gunnery exercises</b> .....	6,000.00	3,626.06	2,373.94	57.96
<b>Naval training station</b> .....	18,000.00	16,594.30	1,405.70	32.93
<b>Naval war college and torpedo     school</b> .....	10,000.00	2,161.18	7,838.82	2,330.36
<b>Ordnance:</b>				
<b>Ordnance and ordnance stores</b> .....	156,000.00	127,604.71	27,395.29	18,322.55
<b>Repairs</b> .....	30,000.00	25,156.78	4,843.22	2,262.23
<b>Torpedo station</b> .....	60,000.00	46,616.62	13,383.38	5,050.02
<b>Civil establishment</b> .....	26,824.00	25,234.77	1,589.23	1,614.91
<b>Contingent</b> .....	8,000.00	4,955.93	3,044.07	189.74
<b>Equipment:</b>				
<b>Equipment of vessels</b> .....	960,000.00	810,579.08	149,420.92	55,327.93
<b>Civil establishment</b> .....	19,025.00	19,024.96	.04	200.21
<b>Contingent</b> .....	15,000.00	6,476.55	8,523.45	6,932.32
<b>Vessels and Docks:</b>				
<b>Maintenance</b> .....	230,000.00	209,233.70	20,766.30	3,394.60
<b>Civil establishment</b> .....	59,197.37	58,365.12	832.25	1,370.75
<b>Contingent</b> .....	20,000.00	19,700.27	299.73	316.75
<b>Naval Home, Philadelphia, Pa.</b> .....	71,215.00	55,607.96	15,607.04	4,094.66
<b>Repairs and preservation at navy-     yards</b> .....	300,000.00	277,943.54	22,056.46	4,340.24
<b>Medical and Surgery:</b>				
<b>Civil department</b> .....	60,000.00	54,927.27	5,072.73	152.71
<b>Repairs</b> .....	20,000.00	15,761.79	4,238.21	120.90
<b>Contingent</b> .....	25,000.00	20,901.79	4,098.21	1,341.27
<b>Requisites and Clothing:</b>				
<b>Requisitions, Navy</b> .....	1,100,000.00	982,099.79	117,900.21	7,940.66
<b>Civil establishment</b> .....	67,581.09	67,115.77	465.32	618.73
<b>Contingent</b> .....	40,000.00	37,428.42	2,571.58	1,011.02

*Appropriations, expenditures, and balances, fiscal year ending June 30, 1892—Continued.*

	Appropriations for fiscal year ending June 30, 1892.	Amount drawn fiscal year ending June 30, 1892.	Balances un- drawn June 30, 1892.	Balances undrawn October 31, 1892.
<b>Construction and Repair:</b>				
Construction and repair .....	\$1,000,000.00	\$888,929.25	\$111,070.75	\$37,653.11
Civil establishment .....	19,972.50	18,088.08	1,884.42	1,884.43
<b>Steam Engineering:</b>				
Steam machinery .....	700,000.00	619,019.49	80,980.51	46,072.00
Civil establishment .....	11,900.00	11,885.14	14.86	14.90
Contingent .....	1,000.00	562.94	437.06	2.98
	13,765,318.83	11,340,601.83	2,424,627.00	1,131,764.00

As will be seen from the foregoing exhibit—

The amount of appropriations for the current expenses of the fiscal year 1892 was, June 30, 1892.....	\$13,765,318.83
Drawn by requisition to June 30, 1892.....	11,340,601.83
Balance undrawn July 1, 1892.....	2,424,627.00
Appropriated by act July 28, 1892.....	548.40
	2,425,175.40
Drawn by requisition from July 1 to October 31, 1892.....	1,293,411.34
Balance undrawn November 1, 1892.....	1,131,764.06
In hands of pay officers November 1, 1892.....	7,312.90
Apparent available balance .....	1,139,076.96

There is chargeable to this balance the following sums:

Due from pay of the Navy to officers and men .....	\$665,039.22
Due from pay of the Marine Corps to officers and men .....	45,151.29
Due from other appropriations for outstanding liabilities..	105,000.00
	815,190.51
Available balance .....	323,886.45

This balance may be decreased when all the accounts pertaining to the fiscal year have been finally adjusted.

#### SALE OF GOVERNMENT PROPERTY—MISCELLANEOUS RECEIPTS.

The sum of \$815,567.83 was deposited in the Treasury from November 1, 1891, to November 1, 1892, as receipts arising from the sale of condemned articles and vessels, gains on bills of exchange, interest, rents, and materials furnished and work performed for other branches of the Government and through other legal disposition of public property under the control of the Department. Of this sum, \$83,453.48 were covered into the Treasury as miscellaneous receipts on account of "proceeds of public property" in accordance with section 3618 of the Revised Statutes, and \$732,114.35 carried to the credit of proper appropriations as authorized by other provisions of law. The amount last mentioned embraces the net proceeds from the sale of lands at the navy-yard, Brooklyn, under the act of February 2, 1890, \$593,860.33

the net proceeds from the sale, under the same act, of naval hospital ships at Brooklyn, \$95,048.78—a total of \$688,909.11. The amount mentioned embraces \$31,854.12, the net proceeds of the sale of condemned vessels stricken from the Naval Register. A detailed statement, prepared in the office of the Fourth Auditor of the Treasury, giving full particulars of these deposits will be found in the appendix to this report.

Since the last annual report of this Department the following-named vessels have been stricken from the Navy Register in pursuance of section 2 of the act of Congress approved August 5, 1882, as unfit for further service: The *Galena* February 29, the *Cohasset* March 4, the *Intrepid* March 9, the *Mayflower* September 23, and the *Ivy* October 7, 1892. The *Galena*, *Cohasset*, and *Intrepid*, together with the *Wyoming*, which had some years before been stricken from the Navy Register, were sold by sealed proposals received under advertisement of April 5 and publicly opened May 9, 1892. The gross proceeds from the sale of these four vessels amounted to \$27,520.13, the expenses of advertising were \$205.31, and the net proceeds, \$27,314.82, were duly covered into the Treasury. Their appraised value was \$19,500. A statement of the bids received and of the returns made to the Fourth Auditor of the Treasury of the proceeds, will be found in the Appendix.

The *Tallapoosa*, stricken from the Navy Register October 10, 1891, was sold at public auction at Buenos Ayres February 23, 1892, for \$4,582.80, American gold, and the net proceeds, \$4,412.26, deposited by her paymaster and covered into the Treasury, as will be seen from the Auditor's statement.

Proposals for the purchase of the *Mayflower* and *Ivy* were invited by advertisement of October 20 last, to be opened November 25.

The only bid received was for the *Ivy*, for which \$1,305 was offered and been accepted. Her appraised value was \$1,000.

The *Palos*, now on the Asiatic station, has been condemned and ordered to be sold.

Under the act of July 19, 1892, authorizing the repair of the *Hartford*, orders have been issued for a survey of that vessel with a view to making the repairs. Of the other old-type vessels, the *Lancaster*, *Argo*, *Mohican*, *Marion*, *Adams*, *Alliance*, *Essex*, *Monocacy*, *Thetis*, *Wenger*, *Yantic*, and *Pinta* are still in commission; the *Enterprise*, by the authority of the act of June 20, 1874, has been assigned to the service of Massachusetts as a training ship, and the *Nipsic* has been designated as a depot ship at Port Orchard.

A statement has been made from time to time that the present administration had proceeded substantially upon the lines of its predecessor. This statement is in a large degree correct. Its cardinal principle is to preserve continuity in the direction of the naval establishment, to make no changes merely for the sake of change, and that they could be justified by clear and conclusive reasons. That



is by steady and continuous growth and progress, not by reversal and upheaval, that the welfare and harmonious development of the Navy will be assured. At the same time every effort has been made to advance where advance was possible. As an illustration of the way which this policy has been pursued, reference may be made to the system of purchase and account initiated by my predecessor. This system, already described, encountered widespread and emphatic opposition in the service; but, its merits as a business system being clearly established, it was given every encouragement, and during the past four years has been developed and perfected as experience showed the necessity of further improvement, until it may now be said to be permanently established.

The principle of continuity of administration has also been adhered to in the great and exceptional work of reconstructing the Navy, which has fallen to this administration. No words of mine can add anything to the commendation to which the administration of Secretary Chandler is entitled for the boldness and enterprise with which this extraordinary task in an absolutely unknown field was undertaken. Neither do I need to dwell upon the progress made during the administration of Secretary Whitney, when the work of reconstruction was carried to a high degree of skill and perfection, superior to that which had been attained in the same types of vessels abroad. In continuing the work it has been my aim not to overturn, but always to advance. The *Chicago*, an excellent vessel, was the type ship of the initial movement. The *Maine* and the *Baltimore* were the new and advanced types of the last administration. The *Indiana*, the *Brooklyn*, and the *Columbia* are the types upon which the present administration rests for final judgment upon its work. There is little doubt, in view of the progress of naval science, that the advance towards higher and higher types will continue steadily in the future; and I can only express the hope and the belief that my successor will find himself able to surpass the best that the present administration has accomplished.

In transmitting this my last report, I take pleasure in acknowledging my obligations to Mr. James R. Soley, the Assistant Secretary, to whom are chiefly due the improved methods of administration which have been adopted during my administration, by which the business of the Department has been greatly simplified and made more efficient, with increased economy to the Government.

I desire also to express my recognition of the able and zealous coöperation which I have received during the past three years and a half from the chiefs of the various bureaus.

The labors that have devolved upon the present administration of the Navy Department, both in the management of the fleet and in works of construction, have not only been far in excess of those of any previous administration since the war, but have required to a much

er degree the solution of difficult and intricate problems, in the u al supervision of the most extensive and various branches of an ture. These manufactures have been conducted in its own ! , in charge of its own officers, and also at the works of private contr ors, in a great number of different establishments, at some forty or fifty widely separated points from Maine to California. The ships alone, in the building of which this administration has been engaged, have aggregated 170,000 tons. It has manufactured 214 heavy guns. It has added largely to the plant of the working yards and has made the Washington gun factory one of the best equipped in the world, with a capacity of manufacture equal to that of many of the foremost establishments of Europe; it has constructed wharves, dry docks, and other important public works at League Island, at Port Royal, and in Puget Sound; it has awarded contracts under the head of "Increase of the Navy" alone to the amount of \$34,908,541, and it has employed labor in the navy-yards upon the new ships and their armament to the amount of \$8,126,671. Its operations have placed the art of steel shipbuilding in the United States on a firm basis, while the manufactured product has been so cheapened that there is now a prospect that steel ships of American build may successfully compete in cost as well as in structural qualities with those made in Europe; and, finally, it has been its endeavor to leave unsettled no questions of serious importance presented to-day by naval science, in its application to construction, armament, and equipment.

In the course of its operations, great as has been their magnitude, re has been no suggestion of scandal or suspicion of jobbery raised nst any person connected with the establishment. Such a result id only be accomplished by a service which, like that of the Navy, mits within its ranks only men of the highest honor and integrity; I can not more fitly close this report than by congratulating this try on the possession of such a school for its officers as the Naval ny at Annapolis, and upon the character, ability, and loyal de- n of the men whom that institution supplies for its service.

B. F. TRACY,

*Secretary of the Navy.*



# APPENDIX.—Estimates, Contracts, etc., Secretary's Office.

*Estimates of appropriations required for the service of the fiscal year ending June 30, 1894, by the Navy Department.*

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1893.
<b>SALARIES, OFFICE OF SECRETARY OF THE NAVY.</b>			
Secretary (July 16, 1892; p. 70, sec. 416) .....	\$8,000.00		
Assistant Secretary (same act) .....	4,500.00		
Chief clerk (same act) .....	2,500.00		
Clerk to the Secretary (same act) .....	2,250.00		
Disbursing clerk (same act) .....	2,250.00		
Two clerks of class four (same act) .....	3,600.00		
One clerk of class four in charge of files and records (same act) .....	1,800.00		
Two clerks of class three (same act) .....	3,200.00		
One stenographer (same act) .....	1,600.00		
One stenographer (same act) .....	1,400.00		
One clerk of class two (same act) .....	1,400.00		
Four clerks of class one (same act) .....	4,800.00		
One clerk (same act) .....	1,000.00		
One telegraph operator (same act) .....	1,000.00		
One carpenter (same act) .....	900.00		
Two messengers at \$840 each (same act) .....	1,680.00		
Three assistant messengers at \$720 each (same act) .....	2,160.00		
Two messenger boys at \$420 each (same act) .....	840.00		
One messenger boy (same act) .....	360.00		
One laborer (same act) .....	660.00		
One clerk of class two for inspection board (same act) .....	1,400.00		
One laborer for inspection board (same act) .....	660.00		
One clerk of class one for examining and retiring board (same act) .....	1,200.00		
		\$49,160.00	\$49,160.00
<b>OFFICE OF NAVAL INTELLIGENCE.</b>			
<b>SALARIES.</b>			
One clerk of class two (submitted) .....		1,400.00	
<b>OFFICE OF THE JUDGE-ADVOCATE-GENERAL.</b>			
<b>Salaries:</b>			
Chief clerk (in lieu of one clerk of class four). (R. S., p. 27, sec. 197; June 8, 1881; vol. 21, p. 164, sec. 1; Mar. 3, 1891; vol. 26, p. 934, sec. 1; July 16, 1892) .....	1,800.00		
One clerk of class four (same acts) .....	1,800.00		
One clerk of class three (same acts) .....	1,600.00		
One clerk of class three (submitted) .....	1,600.00		
One clerk of class two (same acts) .....	1,400.00		
Two clerks of class one (same acts) .....	2,400.00		
One clerk (same acts) .....	1,000.00		
One laborer (same acts) .....	660.00		
		12,200.00	10,660.00
<b>ICE OF THE NAVAL WAR RECORDS OF THE REBELLION.</b>			
<b>Files:</b>			
Two clerks of class four (July 16, 1892) .....	3,600.00		
One clerk of class three (same act) .....	1,600.00		
One clerk of class two (same act) .....	2,800.00		
One clerk of class one (same act) .....	2,400.00		
One clerk at \$1,000 (same act) .....	1,000.00		
One copyists at \$900 each (same act) .....	1,800.00		
One copyists at \$720 each (same act) .....	2,880.00		
Traveling and incidental expenses for collection of records (same act) .....	600.00		
		16,680.00	16,680.00
<b>Final estimate: For beginning the publication of the records of the war of the rebellion, both of the and the Confederate navies (submitted) .....</b>			
	10,000.00	10,000.00	
<b>A slight change has been made in the wording of the estimate for collection of records, the amount re-exchanged, in order that certain expenses, such as documents which can not be surrendered for the office, boxing documents for transmission, and from this appropriation.</b>			

*Estimates of appropriations required for the service of the fiscal year, etc.—Continued.*

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1892.
<b>LIBRARY OF THE NAVY DEPARTMENT.</b>			
<i>Salaries:</i>			
One clerk at \$1,000 (July 16, 1892).....	\$1,000.00		
One assistant messenger at \$720 (same act).....	720.00		
One laborer at \$600 (same act).....	600.00		
<b>For professional books and periodicals for the library (same act).....</b>	<b>1,000.00</b>	<b>\$2,320.00</b>	<b>\$2.00</b>
<b>PRINTING AND BINDING.</b>			
Printing and binding for the Navy Department, including \$12,000 for the Hydrographic Office, to be executed under the direction of the Public Printer.....		70,000.00	70,000.00
<b>PAY OF THE NAVY.</b>			
Pay of officers on sea duty, officers on shore and other duty; officers on waiting orders; officers on the retired list; clerks to commandants of yards and stations; clerks to paymasters at yards and stations; general storekeepers, receiving ships and other vessels; extra pay to men re-enlisting under honorable discharge; interest on deposit by men; pay of petty officers, seamen, landsmen, and boys, including men in the engineer's force, and for the Coast Survey service and Fish Commission, seven thousand five hundred men and seven hundred and fifty boys, at the pay prescribed by law (R. S., p. 246, sec. 1367; R. S., p. 248, sec. 1368-8; R. S., p. 250, sec. 1368; R. S., p. 269, sec. 1369; R. S., p. 260, sec. 1573; R. S., p. 272, sec. 1505, May 12, 1879, vol. 21, p. 3, sec. 1; Aug. 5, 1882, vol. 22, p. 265-7, sec. 1; Mar. 3, 1883, vol. 22, p. 472-3, sec. 1; Mar. 3, 1885, vol. 23, p. 340, sec. 1; Mar. 2, 1889, vol. 25, p. 809, sec. 1; Mar. 2, 1891, vol. 26, p. 799, sec. 1; July 19, 1892).....		7,300,000.00	7,300,000.00
The foregoing estimate is made up as follows:			
Pay of 1,456 officers on the active list.....	\$1,455,000		
Pay of 280 naval cadets under instruction.....	144,500		
Pay of 391 officers on the retired list.....	862,442		
Pay of 89 clerks.....	113,000		
Pay of petty officers, seamen, landsmen, and boys (7,500 men, 750 boys).....	2,745,000		
Extra pay of petty officers and seamen re-enlisting under honorable discharge.....	141,189		
To pay interest on deposits by men (act Feb. 9, 1889).....	10,000		
<b>Total.....</b>	<b>7,451,131</b>		
NOTE.—Although the detailed calculation of the amount required for pay of officers, seamen, etc., of the Navy gives the above total, yet as the appropriation of the past two years, namely, \$7,300,000, has been sufficient for the purpose, it is believed by the Department that the average gains from vacancies, etc., not taken into account in the above calculation are sufficient to reduce the required sum to that amount, which is therefore herein provided for.			
<b>PAY, MISCELLANEOUS.</b>			
For commissions and interest; transportation of funds; exchange; mileage to officers while traveling under orders in the United States, and for actual personal expenses of officers while traveling abroad under orders, and for traveling expenses of apothecaries, yeomen, and civilian employes, and for actual and necessary traveling expenses of naval cadets while proceeding from their homes to the Naval Academy for examination and appointment as cadets; for rent and furniture of buildings and offices not in navy-yards; expenses of courts-martial, prisoners, and prisons and courts of inquiry, boards of investigation, examining boards, with clerks' and witnesses' fees, and traveling expenses and costs; stationery, and recording; expenses of purchasing paymasters' offices			

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**Figure 1**

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*Estimate of the amount required to pay the officers of the United States Navy—Continued.*

## ACTIVE LIST—Continued.

No.	Grade.	Sea duty.			Other duty.		
		No.	Pay per annum.	Total.	No.	Pay per annum.	Total.
33	Passed assistant surgeons, after 5 years from date of appointment.	17	\$2,200	\$37,400	16	\$2,000	\$32,000
35	Passed assistant surgeons, first 5 years	22	2,000	44,000	13	1,800	23,400
21	Assistant surgeons, first 5 years	16	1,700	27,200	5	1,400	7,000
1	Pay director, chief of bureau				1	5,000	5,000
12	Pay directors, after 20 years from date of commission as paymaster				12	4,000	48,000
3	Pay inspectors, fleet paymasters	3	4,400	13,200			
10	Pay inspectors, after 20 years				10	4,000	40,000
1	Paymaster, fleet	1	4,400	4,400			
8	Paymasters, after 20 years	2	4,200	8,400	6	4,000	24,000
12	Paymasters, fourth 5 years	8	3,700	29,600	4	3,600	14,400
6	Paymasters, third 5 years	3	3,500	10,500	3	3,200	9,600
5	Paymasters, second 5 years	3	3,200	9,600	2	2,800	5,600
8	Paymasters, first 5 years	6	2,800	16,800	2	2,400	4,800
13	Passed assistant paymasters, after 5 years	9	2,200	19,800	4	2,000	8,000
7	Passed assistant paymasters, first 5 years	3	2,000	6,000	4	1,800	7,200
6	Assistant paymasters, first 5 years	5	1,700	8,500	1	1,400	1,400
4	Assistant paymasters, after 5 years	3	1,900	5,700	1	1,600	1,600
1	Chief engineer, chief of bureau				1	5,000	5,000
4	Chief engineers, fleet engineers	4	4,400	17,600			
21	Chief engineers, after 20 years	3	4,200	12,600	18	4,000	72,000
7	Chief engineers, fourth 5 years	6	3,700	22,200	1	3,600	3,600
11	Chief engineers, third 5 years	2	3,500	7,000	9	3,200	28,800
15	Chief engineers, second 5 years	4	3,200	12,800	11	2,800	30,800
12	Chief engineers, first 5 years	9	2,800	25,200	3	2,400	7,200
19	Passed assistant engineers, fourth 5 years	10	2,700	27,000	9	2,350	21,150
14	Passed assistant engineers, third 5 years	8	2,450	19,600	6	2,250	13,500
13	Passed assistant engineers, second 5 years	6	2,200	13,200	7	2,000	14,000
12	Passed assistant engineers, first 5 years	7	2,000	14,000	5	1,800	9,000
42	Assistant engineers, fl 5 years	21	1,900	39,900	21	1,600	33,600
21	Assistant engineers, first 5 years	8	1,700	13,600	4	1,400	5,600
12	Chaplains, after 5 years	15	2,800	42,000	6	2,300	13,800
3	Chaplains, first 5 years	1	2,500	2,500	2	2,000	4,000
6	Professors of mathematics, after 15 years				6	3,500	21,000
3	Professors of mathematics, third 5 years				3	3,000	9,000
3	Professors of mathematics, first 5 years				3	2,400	7,200
1	Chief constructor, chief of bureau				1	5,000	5,000
4	Naval constructors, fourth 5 years				4	4,000	16,000
4	Naval constructors, second 5 years				4	3,400	13,600
5	Naval constructors, first 5 years				5	3,200	16,000
6	Assistant naval constructors, second 4 years				6	2,200	13,200
7	Assistant naval constructors, first 4 years				7	2,000	14,000
4	Civil engineers, after 15 years				4	3,500	14,000
5	Civil engineers, third 5 years				5	3,000	15,000
1	Civil engineer, first years				1	2,400	2,400
26	Boatswains, after 12 years from date of appointment	11	1,800	19,800	15	1,600	24,000
2	Boatswains, fourth 3 years	1	1,600	1,600	1	1,300	1,300
5	Boatswains, second 3 years	4	1,300	5,200	1	1,000	1,000
1	Boatswain, first 3 years	1	1,200	1,200			
38	Carpenters, after 12 years	16	1,800	28,800	22	1,600	35,200
1	Carpenter, fourth 3 years				1	1,300	1,300
1	Carpenter, third 3 years	1	1,400	1,400			
1	Carpenter, second 3 years	1	1,300	1,300			
2	Carpenters, first 1 years				2	1,000	2,000
24	Sailmakers, after 12 years	12	1,800	21,600	12	1,600	19,200
1	Sailmaker, third 3 years				1	1,300	1,300
23	Gunners, after 1 years	10	1,800	18,000	13	1,600	20,800
1	Gunner, fourth 3 years				1	1,300	1,300
3	Gunners, third 3 years				3	1,300	3,900
6	Gunners, second 3 years	6	1,300	7,800			
3	Gunners, first 3 years	1	1,200	1,200	2	900	1,800
27	Mates	19	900	17,100	8	700	5,600
1496	Totals	796		1,709,450	700		1,725,550

Total pay for 1,496 officers on the active list ..... \$3,435,000  
 Pay for 289 naval cadets (under instruction at Naval Academy), at \$500 per annum ..... 144,500

Aggregate ..... 3,579,500

*Estimate of the amount required to pay the officers of the United States Navy—Continued.*

## RETIRED LIST.

Grade.	No.	Pay per annum.	Amount.
Rear-admiral .....	1	\$6,000	\$6,000
Do .....	34	4,500	153,000
Commodores .....	8	3,750	30,000
Do .....	2	2,625	5,250
Captains .....	6	3,375	20,270
Do .....	3	2,625	7,875
Do .....	1	2,250	2,250
Do .....	2	1,950	3,900
Commanders .....	9	2,625	23,625
Do .....	1	2,100	2,100
Do .....	1	1,400	1,400
Do .....	1	1,150	1,150
Lieutenant-commanders .....	7	2,250	15,750
Do .....	9	2,100	18,900
Do .....	1	1,950	1,950
Do .....	1	1,500	1,500
Do .....	1	1,350	1,350
Do .....	2	1,100	2,200
Do .....	1	700	700
Lieutenants .....	26	1,950	50,700
Do .....	4	1,800	7,200
Do .....	2	1,200	2,400
Do .....	3	900	2,700
Lieutenants, junior grade .....	9	1,500	13,500
Do .....	2	1,350	2,700
Do .....	2	900	1,800
Do .....	1	700	700
Ensigns .....	9	1,050	9,450
Do .....	2	900	1,800
Do .....	2	600	1,200
Do .....	1	500	500
Do .....	1	300	300
Medical directors .....	1	3,750	3,750
Do .....	11	3,300	36,300
Do .....	2	3,150	6,300
Medical inspectors .....	8	3,300	26,400
Surgeons .....	3	2,625	7,875
Do .....	3	2,400	14,400
Do .....	1	2,100	2,100
Passed assistant surgeons .....	7	1,650	11,550
Do .....	1	1,100	1,100
Assistant surgeons .....	3	1,425	4,275
Do .....	2	1,275	2,550
Do .....	1	850	850
Pay directors .....	1	3,750	3,750
Do .....	8	3,300	26,400
Pay inspectors .....	3	3,300	9,900
Paymasters .....	1	3,150	3,150
Do .....	4	2,625	10,500
Do .....	1	2,400	2,400
Do .....	1	1,400	1,400
Passed assistant paymasters .....	1	1,500	1,500
Assistant paymasters .....	1	1,425	1,425
Do .....	1	600	600
Chief engineers .....	1	3,750	3,750
Do .....	12	3,300	39,600
Do .....	8	2,625	21,000
Do .....	1	2,400	2,400
Second assistant engineers .....	3	2,025	6,075
Do .....	8	1,838	14,704
Do .....	16	1,650	26,400
Do .....	1	1,500	1,500
Do .....	4	1,275	5,100
Do .....	2	1,100	2,200
Do .....	1	850	850
Do .....	1	400	400
Chief assistant engineers .....	4	1,567	6,268
Do .....	15	1,425	21,375
Do .....	6	1,275	7,650
Do .....	1	950	950
Do .....	2	850	1,700
Do .....	1	600	600
Do .....	1	500	500
Do .....	4	2,100	8,400
Chief of mathematics .....	4	2,625	10,500
Instructors .....	1	3,750	3,750
Do .....	1	3,375	3,375
Do .....	3	3,150	9,450
Do .....	1	1,950	1,950
ers .....	1	3,250	3,250



*Estimate of the amount required to pay the officers of the United States Navy—Continued.*

RETIRED LIST—Continued.

Grade.	No.	Pay per annum.	Amount.
Boatswains.....	16	\$1,350	\$21,600
Do.....	1	600	600
Gunners.....	22	1,350	29,700
Carpenters.....	13	1,350	17,550
Sailmakers.....	12	1,350	16,200
Do.....	1	500	500
Total.....	391		\$62,442

*Number of clerks, and their pay, allowed to commandants of yards and stations, to paymasters of yards, to general storekeepers, and on receiving ships and cruising vessels.*

Number and designation.	Where employed.	Pay.
One first clerk to commandant.....	Navy-yard, Portsmouth, N. H.....	\$1,500
One second clerk to commandant.....	do.....	1,200
One clerk to paymaster of yard.....	do.....	1,400
One principal clerk to general storekeeper.....	do.....	1,300
One first clerk to commandant.....	Navy-yard, Boston, Mass.....	1,500
One clerk to paymaster of yard.....	do.....	1,400
One principal clerk to general storekeeper.....	do.....	1,300
One clerk to paymaster of receiving ship.....	do.....	1,300
One first clerk to commandant.....	Navy-yard, New York, N. Y.....	1,500
One second clerk to commandant.....	do.....	1,200
One clerk to paymaster of yard.....	do.....	1,400
One principal clerk to general storekeeper.....	do.....	1,300
One clerk to paymaster of receiving ship.....	do.....	1,300
One first clerk to commandant.....	Navy-yard, League Island, Pa.....	1,500
One second clerk to commandant.....	do.....	1,200
One clerk to paymaster of yard.....	do.....	1,400
One principal clerk to general storekeeper.....	do.....	1,300
One clerk to paymaster of receiving ship.....	do.....	1,300
One first clerk to commandant.....	Navy-yard, Norfolk, Va.....	1,500
One second clerk to commandant.....	do.....	1,200
One clerk to paymaster of yard.....	do.....	1,400
One principal clerk to general storekeeper.....	do.....	1,300
One clerk to paymaster of receiving ship.....	do.....	1,300
One first clerk to commandant.....	Navy-yard, Washington, D. C.....	1,500
Two second clerks to commandant, at \$1,200.....	do.....	2,400
One clerk to paymaster of yard.....	do.....	1,400
One principal clerk to general storekeeper.....	do.....	1,300
One clerk to paymaster of receiving ship.....	do.....	1,300
One second clerk to commandant.....	Navy-yard, Pensacola, Fla.....	1,200
One clerk to paymaster of yard.....	do.....	1,400
One first clerk to commandant.....	Navy-yard, Mare Island, Cal.....	1,400
One second clerk to commandant.....	do.....	1,200
One clerk to paymaster of yard.....	do.....	1,400
One principal clerk to general storekeeper.....	do.....	1,300
One clerk to paymaster of receiving ship.....	do.....	1,300
One clerk to commandant.....	Naval station, New London, Conn.....	1,500
One clerk to paymaster of station.....	do.....	1,300
One clerk to commandant.....	Training station, Newport, R. I.....	1,500
One clerk to paymaster receiving ship.....	do.....	1,300
One clerk to paymaster of station.....	Torpedo station, Newport, R. I.....	1,300
One clerk to superintendent.....	War College, Newport, R. I.....	1,500
One clerk to commandant.....	Naval station, Key West, Fla.....	1,500
One clerk to paymaster of station.....	do.....	1,300
One first clerk to commandant.....	Naval Academy, Annapolis, Md.....	1,500
One clerk to cadets' storekeeper.....	do.....	1,300
One clerk to general storekeeper.....	do.....	1,300
One clerk to commissary.....	do.....	1,300
One clerk to paymaster of Academy.....	do.....	1,300
One clerk to paymaster of ships.....	Naval Academy, Annapolis, Md.....	1,300
One clerk to commanding officer.....	Naval Asylum, Philadelphia, Pa.....	1,500
One clerk to paymaster.....	do.....	1,300
One clerk to general inspector, pay corps.....	do.....	1,300
Eight clerks to paymasters of flagships, at \$1,100 each.....		8,800
Seven clerks to paymasters of second-rate ships, at \$1,100 each.....		7,700
Twenty-one clerks to paymasters of third-rate, training, and store ships, at \$1,000 each.....		21,000
Total.....	Total.....	113,000

## RECAPITULATION.

Total pay for 1,000 officers on the active list .....	\$3,435,000.00
Total pay for 200 naval cadets .....	144,500.00
Total pay for 300 officers on the retired list .....	862,442.00
Total pay for 80 clerks .....	113,000.00
Total .....	4,554,942.00

*Statement of proposals received and opened January 25, 1892, under the Department's advertisement dated January 7, 1892, for the completion of the new Naval Observatory.*

No.	Name and address of bidder.	Amount of bid.
1	William Rothwell, Washington, D. C. ....	\$38,724.00
2	Halliday & Richardson, Washington, D. C. ....	30,277.00
3	John H. Howlett, Washington, D. C. ....	48,000.00
4	Samuel M. Plumley, Washington, D. C. ....	55,940.00
5	William A. Vaughn, Washington, D. C. ....	34,916.00
6	James E. Walter, Georgetown, D. C. ....	36,800.00
7	John Moore, Washington, D. C. ....	33,000.00
8	J. E. & A. L. Pennock, Philadelphia, Pa. †	49,800.00
9	Littleton W. Walker, Georgetown, D. C. ....	34,468.75
10	James L. Parsons, Washington, D. C. ....	42,469.00

\* Contract awarded.

† Informal.

P. H. McLaughlin & Co., with whom the contract for the erection and completion of the new Naval Observatory was made under date of October 2, 1888, failed to proceed with the work satisfactorily, and their contract was, in accordance with the provisions thereof, declared by the Department forfeited on the 8th of September, 1891.

*Statement of proposals received and opened January 26, 1892, under the Department's advertisement of January 11, 1892, for furnishing steel forgings for 4 and 5 inch B. L. R.*

## 4-INCH B. L. R.

Name and address of bidder.	Price per pound.	Time of delivery.
	Cents.	
Bethlehem Iron Co., South Bethlehem, Pa.* .....	29	Within 365 days.
Midvale Steel Co., Nicetown .....	32	Within 119 days.

## 5-INCH B. L. R.

Bethlehem Iron Co., South Bethlehem, Pa.* .....	26	Within 365 days.
Midvale Steel Co., Nicetown, Pa. ....	29	Within 107 days.

\* Contract awarded.

*Statement of proposals received and opened May 7, 1892, under the Department's advertisement of April 21, 1892, for furnishing steel forgings for 6 and 8 inch B. L. R.*

## 6-INCH B. L. R.

Name and address of bidder.	Price per pound.	Time of delivery.
	Cents.	
Bethlehem Iron Co., South Bethlehem, Pa.* .....	32	Within 120 days.
Midvale Steel Co., Nicetown, Philadelphia, Pa. ....	31½	Within 173 days.

## 8-INCH B. L. R.

Bethlehem Iron Co., South Bethlehem, Pa.* .....	33	Within 120 days.
Midvale Steel Co., Nicetown, Philadelphia, Pa. ....	45½	Within 210 days.

\* Contract awarded.

*Statement of proposals received and opened May 20, 1892, under the Department's advertisement of April 30, 1892, for the construction and erection in place on board the U. S. Michigan of two fuel and return-tube boilers and one steam drum.*

Number.	Name and address of bidder.	Total amount of bid.	Amount allowed for old material.	Cost to the Government.	Time for completion from date of contract.	Remarks.
1	Detroit Dry Dock Co., Detroit, Mich.	\$11,500	\$500	\$11,000	<i>Months.</i> 4½	If vessel be at Detroit, Mich.
2	Cleveland Ship Building Co., Cleveland, Ohio.	14,400	550	{ 13,850 13,000	5 4½	{ If vessel be at Erie, Pa. If vessel be at Cleveland, Ohio.
3	N. F. Palmer, Jr., & Co., New York, N. Y.	19,789	576	19,213	4	
4	Lake Erie Boiler Works, Buffalo, N. Y.*	8,650	650	8,000	5	

\* Contract awarded.

*Schedule of bids and statement of contracts awarded and entered into to furnish stationery for the Navy Department and the bureaus and offices thereof for the fiscal year ending June 30, 1893.*

Name and address of bidder.	Class 1.	Class 2.	Class 3.	Class 4.	Class 5.	Class 6.	Class 7.
James J. Chapman, Washington, D. C.	\$469.80	\$469.92	\$131.54	\$131.55			
William Ballantyne & Sons, Washington, D. C.	471.25	471.92	132.10	127.90			
John C. Parker, Washington, D. C.							\$395.00
Sheffield Manufacturing Co., Saugerties, N. Y.	*371.97	*341.93	*122.24	*123.74		\$293.55	
Manhattan Supply Co., New York, N. Y.	467.05	482.56	154.33	131.83	\$561.39	600.45	312.40
Excelsior Typewriter Ribbon Co., New York, N. Y.							1242.08
Tissot & Schultz, New York, N. Y.							1169.75
Wyckoff, Seamans & Benedict, Washington, D. C.						541.65	*294.00
W. H. Teepe, Washington, D. C.	1315.04			132.11		635.34	1241.58
Easton & Rupp, Washington, D. C.	461.14	491.82	133.86	132.64	*476.91	*482.06	395.00
Name and address of bidder.	Class 8.	Class 9.	Class 10.	Class 11.	Class 12.	Class 13.	Class 14.
William Ballantyne & Sons, Washington, D. C.	\$196.51	*\$37.09	\$31.41	\$52.20	\$174.57		
Manhattan Supply Co., New York, N. Y.	*160.95	55.30	42.10	91.10	176.62	\$273.98	*\$564.12
Tissot & Schultz, New York, N. Y.		41.31	44.65	99.36		*241.96	
Columbia Rubber Works Co., New York, N. Y.					*142.03		
W. H. Teepe, Washington, D. C.				*44.44			
Easton & Rupp, Washington, D. C.	193.28	40.79	*31.03	52.08	178.65	292.70	
Name and address of bidder.	Class 15.	Class 16.	Class 17.	Class 18.	Class 19.	Class 20.	Class 21.
William Ballantyne & Sons, Washington, D. C.					*\$101.49	\$71.01	\$53.74
John C. Parker, Washington, D. C.					116.35		
Manhattan Supply Co., New York, N. Y.	\$131.75	\$83.70	\$117.72		116.01	76.73	56.79
Tissot & Schultz, New York, N. Y.		83.53	167.47		117.87	71.41	52.64
W. H. Teepe, Washington, D. C.			*109.97				*48.16
Easton & Rupp, Washington, D. C.	*111.81	*68.27			107.88	*69.52	49.84
Itemsburg & Elliott, Washington, D. C.				*\$378.19			

\* Contract awarded.

† Rejected because samples submitted were inferior to standard.



## SALE OF CONDEMNED VESSELS OF THE NAVY.

Since the date of the last annual report of the Secretary of the Navy, the following-named vessels, which were condemned as unfit for further service and stricken from the Navy Register, in pursuance of section 2 of the act of August 5, 1882 (Stat., 22, p. 296), have been appraised and sold at public sale, in accordance with section 5 of the act of March 3, 1883 (Stat., 22, p. 599), viz: *Galena*, at Portsmouth, N. H.; *Cohasset*, at Newport, R. I.; *Intrepid*, at Brooklyn, N. Y.; *Wyoming*, at Norfolk, Va.

The vessels were sold under written proposals invited by advertisement of April 5, 1892, and publicly opened at the Navy Department May 9, following.

Their appraised value and the names of the bidders and the amount of bids for each is shown in the following table. The highest bid was accepted in each case.

### *List of offers for condemned vessels under advertisement of April 5, 1892.*

#### *Galena:*

E. J. Butler, Arlington, Mass.....	\$13, 131. 00
John Mullen, Boston, Mass.....	12, 325. 00
W. J. Corbett & Co., Boston, Mass.....	12, 100. 00
Herbert H. Ives, Brooklyn, N. Y.....	10, 193. 00
A. Purves & Son, Philadelphia, Pa.....	9, 550. 00

#### *Cohasset:*

I. L. Snow & Co., Rockland, Me.....	825. 00
John H. Gregory, Perth Amboy, N. J.....	655. 00
W. H. Wyman, Chelsea, Mass.....	562. 50
L. F. S. Davis, Boston, Mass.....	557. 90
E. J. Butler, Arlington, Mass.....	531. 00

#### *Intrepid:*

Matthew Gill, jr., Philadelphia, Pa.....	2, 253. 13
E. J. Butler, Arlington, Mass.....	2, 161. 00
Herbert H. Ives, Brooklyn, N. Y.....	2, 077. 00
Henry F. Hammell, New York, N. Y.....	2, 015. 00
M. H. Gregory, Great Neck, N. Y.....	1, 301. 00
W. J. Corbett & Co., Boston, Mass.....	1, 200. 00
G. W. Schultz & Co., Philadelphia, Pa.....	1, 200. 00
A. Purves & Son, Philadelphia, Pa.....	1, 185. 00
John Mullen, Boston, Mass.....	1, 175. 00
Elbert Hegeman, East Norwich, N. Y.....	1, 010. 00
W. J. Bannerman, Brooklyn, N. Y.....	631. 00
W. W. Vandewater, Brooklyn, N. Y.....	575. 00

#### *Wyoming:*

Ed. J. Butler, Arlington, Mass.....	11, 311. 00
I. L. Snow, Rockland, Me.....	11, 100. 00
A. Purves & Son, Philadelphia, Pa.....	10, 150. 00
Herbert H. Ives, Brooklyn, N. Y.....	10, 100. 00

Proposals were invited at the same time for the tug *Speedwell*, but no offer was received.

The total amount of the accepted bids was \$27,520.13, the expenses of advertising the sale \$205.31, and the sum covered into the Treasury, under section 3618 of the Revised Statutes, as "miscellaneous receipts on account of proceeds of public property," \$27,314.82.

The annexed is a copy of the account current of these sales rendered to the accounting officers of the Treasury by the Secretary of the Navy:

*B. F. Tracy, Secretary of the Navy, in account current with the United States, for proceeds of sale of U. S. S. Galena, Cohasset, Intrepid, and Wyoming under public advertisement of April 5, 1892, inviting written proposals, and in pursuance of the acts of August 5, 1882, 22 Statutes, page 296, and March 3, 1883, 22 Statutes, page 599.*

Dr.

Cr.

1892.			1892.		
May 16	To deposits accompanying the following accepted bids:		Apr. 8	By amount paid for advertising, as follows:	
16	E. J. Butler, for the Galena	\$13, 181.00		News, Newport, R. I., No. 1	\$10.68
16	I. L. Snow & Co., for the Cohasset	825.00		Tribune, New York, No. 2	61.20
16	Matthew Gill, jr., for the Intrepid	253.13	29	Standard-Union, Brooklyn, No. 3	34.20
16	Ed. J. Butler, for the Wyoming	11, 311.00		Landmark, Norfolk, No. 4	15.30
31	Matthew Gill, jr., for the Intrepid, balance due	2, 000.00	May 5	Press, Philadelphia, No. 5	46.40
			5	Chronicle, Portsmouth, N. H., No. 6	9.53
				Advertiser, Boston, No. 7	28.00
			June 4	Amount covered into the U. S. Treasury as miscellaneous receipts	27, 314.82
		27, 520.13			27, 520.13

NAVY DEPARTMENT, June 6, 1892.

JAMES R. SOLEY,  
Acting Secretary of the Navy.

The Fourth Auditor of the Treasury, in a communication to the Secretary of the Navy under date of September 5, 1892, reported the account as settled and balanced.

Proposals for the tugs *Mayflower*, at Norfolk, appraised at \$2,500, and *Ivy*, at Mare Island, appraised at \$1,000, were invited by advertisement of October 20, and opened at the Navy Department, November 25, 1892. The only bid received was from George Johnson, San Francisco, for the *Ivy*, \$1,305, which was accepted.

The U. S. S. *Tallapoosa*, stricken from the Navy Register, October 10, 1891, was sold after public advertisement at auction at Buenos Ayres, February 23, 1892, to Geronimo Parodi & Co., for \$4,750, Argentine gold, equivalent to \$4,582.80 United States money. After paying expenses of sale, the net amount remaining, \$4,412.26, was placed in the hands of the pay officer of the vessel and has been covered into the Treasury in pursuance of section 3618 of the Revised Statutes.

JOHN W. HOGG,  
Chief Clerk, Navy Department.

## RECEIPTS FROM SALE OF GOVERNMENT PROPERTY.

*Statement of deposits on account of sales of Government property, Navy Department, from November 1, 1891, to November 1, 1892.*

[Compiled in the Fourth Auditor's Office, by direction of the Secretary of the Treasury.]

Date of deposit.	Place of deposit.	By whom deposited.	Nature of property sold.	Amount covered by miscellaneous receipts.	Amount covered to the appropriation.	Total amount deposited.	Remarks.
1891.							
Nov. 17	United States Treasury	Wm. M. Folger, chief Bureau Ordnance.	Electric primers supplied E. L. Dupont & Co. for test of Government powder.		\$33.16	\$33.16	Bureau Ordnance.
21	do	H. B. Lowry, major and quartermaster, U. S. Marine Corps.	Proceeds sale of flags, arms, and accoutrements.	\$8.86		8.86	
25	The First National Bank, Newport, R. I.	J. Corwine, passed assistant paymaster, U. S. Navy.	Proceeds sale of clothing of crew of wrecked steamer Galena.		6.60	6.60	Bureau Provisions and Clothing.
27	New York	H. T. B. Harris, paymaster, U. S. Navy.	Proceeds sale of 184,800 pounds of rosin.	266.35		266.35	Bureau Construction and Repair.
Dec. 4	United States Treasury	Secretary of the Navy	Proceeds sale U. S. S. Despatch, act Mar. 3, 1883.	127.04		127.04	
5	do	A. W. Bacon, paymaster, U. S. Navy.	Proceeds sale steel turnings, act Mar. 3, 1875.		949.62	949.62	Bureau Ordnance.
21	do	H. B. Lowry, major and quartermaster, U. S. Marine Corps.	Proceeds sale condemned clothing and furniture.	23.25		23.25	
22	The First National Bank, Portsmouth, N. H.	J. Foster, paymaster, U. S. Navy.	Proceeds sale condemned stores.	6,961.77	2,519.51	9,501.28	Bureau Ordnance, act Mar. 3, 1875, \$1,749.39.
	do	do	do				Bureau Provisions and Clothing, clothing and small stores fund, \$770.12.
	do	do	do				Bureau Equipment, \$1,978.46.
	do	do	do				Bureau Construction and Repair, \$2,490.32.
	do	do	do				Bureau Yards and Docks, \$250.71.
	do	do	do				Bureau Steam Engineering, \$1,760.29.
	do	do	do				Bureau Provisions and Clothing, \$501.98.
28	United States Treasury	T. J. Holmes, disbursing clerk	Bronze and iron castings furnished Bureau of Engraving and Printing.		64.00	64.00	Bureau Ordnance.

### SALES OF GOVERNMENT PROPERTY.

	and quar- master, ... Marine	Condemned furniture.....	8. 67	8. 67
.....do.....	J. N. Phillips, assistant pay- master, U. S. Navy.	Gain on exchange and sale of clothing.	184. 14	184. 31
.....do.....	U. A. McDaniel, paymaster, U. S. Navy.	Gain on exchange, \$3,795.25; gain on yarn, \$3,072.58.	6,867. 83	6,867. 83
31 New York	H. T. B. Harris, paymaster, U. S. Navy.	Clothing sold to U. S. N. S. S. Marys.	440. 29	440. 29
1892.				
Jan. 2	U. S. Treasury	Gain on exchange	13. 30	13. 30
2	do	Condemned provisions.....	145. 55	145. 55
2	do	Interest on daily balance, \$915.04, gain on exchange, \$2,673.94.	3,288. 98	3,288. 98
11	do	Bronze castings furnished Bu- reau of Engraving and Printing.	6. 90	6. 90
22	do	Gain on exchange	102. 78	102. 78
22	do	Condemned marine stores.....	2. 45	2. 45
22	do	Gain on exchange and sale of condemned stores.	593. 64	590. 00
do	do	do		
do	do	do		
do	do	do		
do	do	do		
27	do	Gain on exchange	215. 04	215. 04
27	do	Bronze castings furnished Bureau of Engraving and Printing.	.05	.05
9 New York	B. F. Tracy, Secretary of the Navy.	Proceeds sale U. S. naval hos- pital lands, navy yard, Brooklyn, N. Y., act ap- proved July 2, 1890.	95,048. 78	95,048. 78
9	do	do	563,890. 33	563,890. 33
28 United States Treasury	H. B. Lowry, major and quar- termaster, U. S. Marine Corps.	Proceeds condemned clothing and horse.	62. 37	62. 37
30	do	Proceeds condemned clothing and horse.	18. 85	18. 85
30 San Francisco	J. R. Stanton, paymaster, U. S. Navy.	Proceeds sale condemned stores	14,981. 34	16,435. 05
do	do	do	3,453. 71	1975,825. 27.
				Bureau of Ordnance, act June 20, 1878, \$562.59.



*Statement of deposits on account of sales of Government property, Navy Department, from November 1, 1892, to November 1, 1893—Continued.*

Date of deposit.	Place of deposit.	By whom deposited.	Nature of property sold.	Amount covered by miscellaneous receipts.	Amount covered to the appropriation.	Total amount deposited.	Remarks.
1892. Jan. 30	San Francisco	J. R. Stanton, paymaster, U. S. Navy.	Proceeds of condemned stores.				Bureau of Provisions and Clothing, clothing and small stores fund, \$533.85.
	do	do	do				Bureau Provisions and Clothing, \$449.40.
	do	do	do				Bureau Equipment, \$3,128.66.
	do	do	do				Bureau Construction and Repair, \$2,628.18.
	do	do	do				Bureau Yards and Docks, \$463.51.
	do	do	do				Bureau Steam Engineering, \$8,202.14.
	do	do	do				Bureau Medicine and Surgery, \$21.45.
	do	do	do				Bureau Equipment, \$106.74.
Feb. 13	New York	H. T. B. Harris, paymaster, U. S. Navy.	Proceeds of flags furnished school ship St. Mary's, and clothing issued to revenue-cutter Grant.		\$115.78	\$115.78	Bureau Provisions and Clothing, clothing and small stores fund, \$9.04.
	do	do	do				Bureau Ordnance.
18	United States Treasury	Thos. J. Hobbs, disbursing clerk.	Bronze castings furnished Bureau of Engraving and Printing.		23.41	23.41	Bureau of Equipment and Bureau of Yards and Docks.
12	New York	H. R. Smith, passed assistant paymaster, U. S. Navy.	Proceeds of condemned stores.	\$303.50		303.50	Bureau of Provisions and Clothing.
25	do	John Furey, paymaster U. S. Navy.	Clothing sold to naval reserve at Rochester, N. Y.		10.39	10.39	
Mar. 5	United States Treasury	Livingston Hunt, assistant paymaster, U. S. Navy.	Gain on exchange	6.49		6.49	
7	do	H. B. Lowry, major and quartermaster, U. S. Marine Corps.	Fuel furnished offices		531.52	531.52	
8	Philadelphia	H. M. Denniston, pay director, U. S. Navy.	Rent of wharf property	272.91		272.91	
25	New York	H. T. B. Harris, paymaster, U. S. Navy.	Rents at Wallabout	1,479.77		1,479.77	
29	United States Treasury	Seligman Bros., special agents Navy Department.	Interest on daily balances	1,206.98		1,206.98	
30	New York	H. G. Colby, paymaster, U. S. Navy.	Proceeds condemned stores, Marion.	91.10		91.10	

## SALES OF GOVERNMENT PROPERTY.

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			Print- ing and ---ing and	9.46	9.46	Bureau of Ordnance.
4	United States Treasury	John Furey, paymaster, U. S. Navy.	Clothing sold to naval re-		126.41	Bureau of Ordnance and Clothing.
	do	Thos. J. Hobbs, disbursing clerk.	Iron castings furnished Bu-		81.46	Bureau of Ordnance.
7	do	O. C. Tiffany, passed assist-	Print- ing and ---ing and	40.23		
7	do	ant paymaster, U. S. Navy.	Gain on exchange and increase			
9	do	C. Schenck, pay director, U. S. Navy.	In value of yarn.	22.01		Bureau of Equipment.
12	New York	J. A. Mudd, assistant pay-	Canvas issued to coat store-			
	do	master, U. S. Navy.	keeper at Annapolis, Md.	4,412.20		
20	United States Treasury	John Furey, paymaster, U. S. Navy.	Proceeds sale Tallapoosa, act		187.55	Bureau of Ordnance and Clothing.
	do	S. R. Colbourn, paymaster, U. S. Navy.	March 2, 1883.	451.80		
20	do	W. Goldborough, paymaster, U. S. Navy.	Proceeds sale clothing to rev-			
20	do	L. A. Fraley, paymaster, U. S. Navy.	enue-steamer McLane.	578.36		
21	New York	A. J. Clark, pay director, U. S. Navy.	Gain on exchange and con-		65.52	Valued on exchange, \$41.42;
	do	do	demmed made clothing.		65.00	condemned clothing, \$1.16.
	do	do	Refunded by Manhattan Oil			Bureau Steam Engineering.
25	do	do	Co., for excess of cost of oil			
	do	do	purchased on account of			
	do	do	their contract.		313.17	Bureau Construction and Re-
	do	do	Refunded by Manhattan Oil			pair, \$101.92.
	do	do	Co., for excess of cost of ar-			
	do	do	ticles purchased on account			
	do	do	of contract.			
23	United States Treasury	A. W. Parsons, disbursing agent.	Payment for one standard		324.11	Bureau Equipment, \$15.00
	do	do	ship's compass and attach-			Bureau Steam Engineering.
	do	do	ments furnished the steamer			\$106.25.
	do	do	Hamlet, of U. S. Coast and			Bureau Equipment
	do	do	Geodetic Survey.			
May 3	New York	A. J. Clark, pay director, U. S. Navy.	Refunded by Flako Bros. for			
	do	do	excess of cost of articles			
	do	do	purchased on account of			
	do	do	contract.		22.00	Bureau Construction and Re-
	do	do	Gain on exchange and increase			pair
4	United States Treasury	Reab Frazer, passed assistant	In value of yarn.	292.43		Gain on exchange, \$281.70;
3	do	paymaster, U. S. Navy.	Bronze castings, and melting		164.34	value of gun T-ports
	do	Thos. J. Hobbs, disbursing clerk.	worms and shovels plat-			Bureau Ordnance
	do	do	for Parsons Engraving and			
4	do	M. R. Calvert, assistant pay-	Print- ing and ---ing and	292.91		
	do	master, U. S. Navy.	Gain on exchange			
4	do	H. C. Colby, paymaster U. S. Navy.	do	695.54		

*Statement of deposits on account of sales of Government property, Navy Department, from November 1, 1894, to November 1, 1895—Continued.*

Date of deposit.	Place of deposit.	By whom deposited.	Nature of property sold.	Amount covered to miscellaneous receipts.	Amount covered to the appropriation.	Total amount deposited.	Remarks.
1895.							
May 11	United States Treasury	R. T. M. Ball, passed assistant paymaster, U. S. Navy.	Gain on exchange	\$292.79		\$292.79	
10	New York	H. T. B. Harris, paymaster, U. S. Navy.	Proceeds sale ordnance material, act Mar. 3, 1875.		\$3,183.42	3,183.42	Bureau Ordnance.
13	Philadelphia	H. M. Denniston, pay director, U. S. Navy.	Excess paid on purchase of material not delivered under contract received from H. T. Kent.		30.41	30.41	Bureau Provisions and Clothing.
13	New York	John Furey, paymaster, U. S. Navy.	Proceeds sale of clothing to U. S. R. S. Johnson.		197.20	197.20	Do.
16	United States Treasury	I. G. Hobbs, paymaster, U. S. Navy.	Gain on exchange	15.81		15.81	
14	New York	A. G. Clark, pay director, U. S. Navy.	Excess of cost of black oil purchased on account of contract of Aquila Rich.		20.88	20.88	
20	do	do	Excess of cost of articles purchased on account of contract of J. B. Morrell & Co.		177.53	177.53	Bureau Equipment \$121.50.
do	do	do	do				
do	do	do	do				
18	San Francisco	G. A. Lyon, pay inspector, U. S. Navy.	Excess of cost of supplies not delivered on contract by J. N. Knowles.		30.00	30.00	Bureau Steam Engineering, \$17.88. Bureau Construction and Repair, \$38.15.
29	New York	John Furey, paymaster, U. S. Navy.	Clothing sold naval reserve New York.		309.76	309.76	Bureau Construction and Repair. Bureau Provisions and Clothing.
June 8	United States Treasury	H. C. Machette, paymaster, U. S. Navy.	Gain on exchange	5.50		5.50	
6	do	Secretary of the Navy.	Proceeds of old vessels, act Mar. 3, 1883.	27,314.82		27,314.82	
6	do	T. J. Hobbs, disbursing clerk.	Iron castings furnished Bureau Engraving and Printing.		7.12	7.12	Bureau Ordnance.
7	New York	John Furey, paymaster, U. S. Navy.	Clothing furnished revenue steamer Perry and naval reserve New York.		300.69	300.69	Bureau Provisions and Clothing.
9	United States Treasury	John W. Parsons, disbursing clerk.	Coal furnished Coast and Geodetic Survey steamer Rache.		110.80	110.80	Bureau Equipment.
13	The First National Bank of Newport, R. I.	J. Couvline, passed assistant paymaster, U. S. Navy.	Sale of effects of crew of wrecked Galena.		.70	.70	Bureau Provisions and Clothing.



## REPORT OF THE SECRETARY OF THE NAVY.

Statement of deposits on account of sales of Government property, Navy Department, from November 1, 1891, to November 1, 1892—Continued.

Date of deposit.	Place of deposit.	By whom deposited.	Nature of property sold.	Amount covered to miscellaneous receipts.	Amount covered to the appropriation.	Total amount deposited.	Remarks.
1892.							
July 26	United States Treasury	H. B. Lowry, major and quartermaster, U. S. Marine Corps.	Condemned military stores.	\$4.17	.....	\$4.17	
30	New York	Jno. Furey, paymaster, U. S. Navy.	Clothing sold to Fish Commission schooner Grampus.	.....	\$53.00	53.00	Bureau Provisions and Clothing.
Aug. 2	do	A. J. Clark, pay director, U. S. Navy.	Excess of cost of brushes purchased on account of failure of C. H. and E. S. Goldberg to fill contract.	.....	30.00	30.00	Do.
30	United States Treasury	Reah Frazer, passed assistant paymaster, U. S. Navy.	Gain on exchange	551.73	.....	551.73	
26	do	M. R. Calvert, late assistant paymaster, U. S. Navy.	do	407.84	.....	407.84	
Sept. 7	New York	A. J. Clark, pay director, U. S. Navy.	Refunded by contractors for excess of cost on articles purchased on account of their contracts.	.....	55.39	55.39	
14	The First National Bank of Portsmouth, N. H.	J. Foster, paymaster, U. S. Navy.	Condemned stores	878.67	6,251.43	7,130.10	Bureau Ordnance, act Mar. 3, 1875, \$6,250.08.
14	do	do	do	.....	.....	.....	Bureau Provisions and Clothing, \$1.40.
14	do	do	do	.....	.....	.....	Bureau Yards and Docks, \$121.08.
14	do	do	do	.....	.....	.....	Bureau Equipment, \$388.72.
14	do	do	do	.....	.....	.....	Bureau Construction and Repair, \$47.85.
14	do	do	do	.....	.....	.....	Bureau Provisions and Clothing, \$107.51.
14	do	do	do	.....	.....	.....	Bureau Steam Engineering, \$213.51.
20	Philadelphia	J. N. Speel, paymaster, U. S. Navy.	do	1,802.00	218.00	1,820.00	Bureau Ordnance, act Mar. 3, 1875, \$218.
20	do	do	do	.....	.....	.....	General stores, \$1,602.
29	New York	H. T. B. Harris, paymaster, U. S. Navy.	Rent of wharf property	125.00	.....	125.00	
Oct. 11	United States Treasury	T. T. Caswell, pay inspector, U. S. Navy.	On account of default in contract, refunded by Geo. V. B. Clark.	.....	23.00	23.00	Bureau Provisions and Clothing.
13	do	Secretary of the Navy	Boilers sold to Fish Commission.	2,500.00	.....	2,500.00	

	Credit	Debit	Total
Paid:			
United States Treasury.....	1,905.45		1,905.45
Grand total.....	83,453.48	732,114.35	815,567.83



# REPORT

OF

## THE BOARD OF VISITORS

TO THE

### NAVAL ACADEMY, 1892.

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#### **The SECRETARY OF THE NAVY:**

The Board of Visitors to the Naval Academy assembled at Annapolis, on Monday, May 30, at 10:30 a. m., and were officially received by Capt. R. L. Phythian, the Superintendent of the Academy and his staff. The cadets were paraded as a battalion of infantry. A salute of seventeen guns was fired, the battalion passing in review. After these ceremonies the Board made a tour of the Academy and grounds, inspecting the various buildings and departments.

In the afternoon the Board assembled and officially organized by the election of Hilary A. Herbert, Representative in Congress from the State of Alabama as president, and J. N. Dolph, Senator in Congress, from the State of Oregon, as vice-president of the Board. Lieut. C. W. Bartlett, U. S. Navy, was elected secretary, and entered upon the performance of his duties.

The Right Rev. C. T. Quintard, D.D., bishop of Tennessee, was unanimously chosen to deliver, on behalf of the Board, the address to the class on the graduation day, June 3.

The president, by direction of the Board, appointed the following committees:

#### STANDING COMMITTEES.

- (1) *Conditions of admission to and discharge from the Academy.*—for Edward D. White, Right Rev. C. T. Quintard, Hon. James W. Wadsworth.
- (2) *Subjects of study and standard of scholarship.*—Levi D. Miller, Right Rev. C. T. Quintard, Hon. John Russell Young.
- (3) *Grounds, buildings, and sanitary condition.*—Hon. Barnes Comp-Edward P. Boutelle, Hon. James D. Wadsworth.
- (4) *Seamanship, ordnance, and navigation.*—Edward Vail, J. Albert ker, Hon. John Russell Young.
- (5) *Discipline, drill, practical exercises, administration and police.*—J. M. Dolph, Senator Edward D. White, Hon. James W. Wads-



(6) *Steam, mathematics, physics, and mechanics.*—J. Albert Walker, Edward Vail, Levi D. Miller, Hon. Barnes Compton.

(7) *English studies, modern languages, drawing, physiology and hygiene.*—Right Rev. C. T. Quintard, Thomas Dolan, Levi D. Miller.

(8) *Finance and library.*—Thomas Dolan, Senator J. N. Dolph, Edward P. Boutelle.

(9) *Final report.*—Hon. John Russell Young, Senator J. N. Dolph, Thomas Dolan, Hon. Hilary A. Herbert.

On May 31, at 9 a. m., the Board embarked in the *Enterprise*, and witnessed seamanship drill. At 4 p. m. the battalion were drilled in infantry tactics. On June 1, at 9 a. m., there was target practice with great guns, followed by a visit to the flagship. At 4 p. m. the cadets were drilled as a battalion of artillery. June 2, at 9 a. m., there was a competitive drill for the battalion flag, and in the afternoon there were various drills at the gymnasium.

At 10:30 a. m., June 3, the members of the Board were presented to the honorable Secretary of the Navy in the library building, after which they proceeded to the chapel and attended the ceremonies of graduation.

#### CONDITIONS OF ADMISSION TO AND DISCHARGE FROM THE ACADEMY.

The Board after discussing the conditions of admission to and discharge from the Academy, and hearing the recommendations of the Superintendent, arrived at this conclusion, that Congress be urgently requested to pass an act, putting the appointments for admission to the Naval Academy on the same basis as the appointments to the Military Academy, namely, a requirement, that the nominations be made one year in advance of the time of admission.

The Board further recommended that instead of the present system of examination, each cadet be admitted to a probation of three months, in order that his conduct and general qualifications for admission be determined. Rules and regulations on this subject should be adopted by the commandant of the Academy with the approval of the Secretary of the Navy.

The Board are furthermore of the opinion, that in the matter of discharges from the Academy, a rule be adopted preventing the reappointment of students who have been dismissed. This rule should apply to dismissals for misconduct, and not because of failure to obtain specified academic averages.

#### SUBJECTS OF STUDY AND STANDARD OF SCHOLARSHIPS.

The Board after considering the standard of scholarships, and the scope of academic studies, recommended that the course of study be so arranged as to give a five years' course at the Academy, instead of the four years now provided. To this should be added one year's sea service before final graduation, in lieu of the two years now required.

#### GROUNDS, BUILDINGS, AND SANITARY CONDITION.

The Board report the grounds about the Academy buildings to be a model of beauty and neatness, showing every evidence of great care and attention on the part of the officers in charge. A visit to the new grounds found the work of grading and otherwise improving the surroundings to be at a standstill, for the reason that there is no available

appropriation with which to continue the work. The wall has been extended around the entire grounds, however, and the new buildings are completed and nearly ready for occupancy.

A reasonable appropriation should be provided for the completion of the necessary improvements on these grounds, as in their present condition they detract very much from the otherwise excellent appearance of the institution.

The sanitary condition is good, a fact demonstrated by the general good health of the cadets. Some additional drainage is required, but this is a matter entirely within the control of the officers.

Of the buildings so much can not be said, many of them being old and unsuitable for the purposes for which they are intended. The main building in which the cadets are quartered is in very good condition, but it is not equal to the demands. A considerable number of the cadets have to find quarters in other buildings; and the effect of thus separating the cadets is to very materially interfere with the work of the Academy. As every minute in the day is utilized, much valuable time is lost in marching to and from the several departments and confusion is prevented only by constant watchfulness.

The officers suggest a new grouping of the buildings, so that the dormitories, armory, mess hall and recitation rooms be as near to each other as practicable and not too remote from those points on the water where sail and boat drills begin. This suggestion would involve a carefully prepared plan for the permanent location of the buildings in the most convenient form, and a considerable outlay; but as this institution is doing a great work and one in which the people take a just pride, we are satisfied that in the end it would prove money wisely expended.

There are, however, some matters pertaining to the buildings which should receive the prompt attention of Congress. Additional quarters should be provided for at least twelve officers as soon as possible. This is one of the greatest needs of the institution to day, because the existing condition inflicts a serious hardship upon the junior officers. Quarters are assigned according to rank and when the younger officers are ordered to duty here they find that all the quarters are taken, the result being that they have to board themselves outside the grounds. The effect of this is to place a burden of expense upon the men least able to afford it. The erection of the additional quarters needed would not necessarily involve a large expenditure, and we earnestly recommend that adequate provisions be made for said buildings. The building adjoining the *Phlox* wharf, used as a workshop and storehouse, is not only too small, but is an unsightly object, being in a most dilapidated condition and requiring constant repairs. It is suggested that this building be taken down and replaced by one large enough to accommodate a carpenter shop, dynamo room, and general storehouse. Such a building would not require a large outlay.

The naval cemetery is a beautiful spot and should be laid out according to the plans already formulated by the superintendent. Suitable should be provided for staking off the plats, which are now laid with wooden posts. Unless this is done it will become necessary in time to make a new survey, as the wooden posts will not stand. The naval hospital still remains in charge of a janitor and is gradually going to ruin. In this instance we are constrained to differ from recommendations of former boards, namely: that the Government dispose of this property. Something we think should be done with the building, or if it is not of a character to be of any use or

value to the institution the material of which it is composed should be sold for what it will bring and the proceeds applied to some useful purpose. But your committee think it unwise to sell or part with the real estate. This institution has grown rapidly in response to the demands of a growing country and its additional requirements. It will continue to grow and more space will be needed for the accommodation of its increasing and necessary improvement. The grounds can not well be extended further in the direction of the city. No available ground can be obtained, as far as your committee is informed, in any other direction. The Board therefore is decidedly of the opinion that the property referred to should be retained by the Government.

#### SEAMANSHIP, ORDNANCE, AND NAVIGATION.

While the introduction of iron and steel shipbuilding in the Navy and the consequent decrease of sail power, has rendered the study of seamanship, as a whole, of less importance than in former years, there is still much of this branch of study that is and will continue to be of the most important practical application on board a vessel of any type, it being clear to the mind of the Board that the well-educated seaman is necessary for the proper handling of ships under steam as well as under sail.

The amount of time allowed this branch of study in the Department is relatively small, and is not more than adequate for the acquiring of such a knowledge of seamanship as any officer should possess.

In view of the rapid strides that have been made in this country in the matter of metal shipbuilding it is very important that a work on the subject, descriptive of the framing, plating, and general construction of the hulls of various types of our latest vessels of war, be placed in the hands of cadets of the first class. The text-books upon the subject now in use are foreign publications, which, while the best now procurable, treat of foreign vessels only and those of comparatively antiquated types. Drawing taken from plans of some of our latest vessels of war are now being prepared in the Department with a view to the preparation of a text-book to replace those now in use.

In connection with the study of ship building it is of great importance that models in miniature, showing in section various parts of the hull of one of our vessels of war of the latest type, be furnished for the instruction of cadets.

The Board finds this department of study and practice in a very high state of proficiency. During the several days of the Board's visit it was given opportunity to witness drills in each of the various branches of this department. The infantry drill included a sham battle, well conducted. The target practice with heavy guns on shipboard, with the vessel under way, was particularly commendable, and convinced the Board that this branch of instruction had received careful attention. The artillery drill with rapid-fire guns also deserves praise-worthy mention. The sword drills and setting-up drills were fully shown to the Board, and were highly creditable, as in fact were all of the different drills conducted by the department.

The course in ordnance and gunnery is taught, so far as the theory is concerned, from text-books prepared at the Academy, supplemented from time to time by notes covering recent changes and advances made in the development of ordnance material or in the use of modern weapons.

[illegible]

The American people are entitled to know the truth about the activities of the CIA and the FBI in the past and the present. The American people have the right to know the truth about the activities of the CIA and the FBI in the past and the present. The American people have the right to know the truth about the activities of the CIA and the FBI in the past and the present.

During the past year in both the United States and abroad, it is now possible to enter the world's greatest art museum without feeling it dull and cold. Through the efforts of the National Foundation for the Advancement of the Arts, the National Endowment for the Arts, the National Gallery of Art, and the National Museum of Modern Art, the National Gallery of Art has been transformed into a modern art gallery for the people. The National Gallery of Art is a necessity of the Department of the Interior, and the National Museum of Modern Art is the heart of the Department of the Interior.

[illegible]

This department should be given the authority to make appropriation of about \$1.10 for the purchase of all books, which would permit the normal student to keep up with the full and newest scientific instruments and the latest equipment for the modern applications.

1. Different instruments of this department are now given away on time and again, at great cost of money, repairs and the provision is made to cover the expense of such work. In the place of employing a common messenger, as is the present practice in this department, Board recommends the employment of an experienced mechanic in addition to doing all work at present done by the messenger. He also be able to make such repairs, believing that this course would prove itself to be an economical one and increase the efficiency of department.

these three important practical departments of seamanship, ordnance and navigation the Board finds that with the exception of ordnance, which is reasonably well equipped with modern appliances, they are supplied with old and obsolete instruments and models not at present utilized in active service that are calculated to mislead a student and give wrong ideas that afterwards find correction by being brought in contact with the more recent and improved models. The Board is of opinion that the good of this Academy and the efficiency of the students would be greatly benefited if it could from time to time be handsomely supplied with every new device that is recognized as sufficiently meritorious to receive adoption and use in the Navy.

## DISCIPLINE, DRILL, PRACTICAL EXERCISES, ADMINISTRATION, AND POLICE.

The Board have great pleasure in reporting that the discipline of the Academy is admirable. The regulations are necessarily exacting, but they are enforced with wisdom and equity. The officers are able and efficient, and the Board have nothing to offer concerning them but words of commendation. All appear to be laboring with assiduity and zeal to promote discipline, to increase the efficiency of the institution, and to administer the regulations with justice.

The Board regret to learn that, notwithstanding the stringent provisions of law upon the subject, and the intelligent and earnest efforts of the superintendent and officers of the Academy to suppress it, hazing has not entirely disappeared. It seems inexplicable that this brutal habit prohibited by law, inhuman, unmanly, un-American, and cowardly, should be continued to the disgrace of the Academy. True manhood will prompt its possessor to defend the weak and to deal justly with inferiors, and the spirit which prompts the strong to oppress the weak or the superior to insult the inferior is wholly inexcusable, even in the most youthful and inexperienced persons. The prompt dismissal from the Academy of any cadet guilty of such misconduct is a punishment not too severe. The Board is gratified to learn that there has been a marked improvement in this respect in recent years, and hopes that by wise counsels and strict enforcement of the law this most reprehensible habit may become odious with the cadets themselves and be completely suppressed. There may be difficulties in the way of suppressing hazing not known to those inexperienced in dealing with such matters, but to the Board it appears that the habit should be entirely suppressed.

The Board, after some discussion, adopted a resolution requesting the Secretary of the Navy, if in his opinion deemed advisable, to communicate to the cadets this expression of the Board's opinion as to the criminal character of the hazing practice.

The various drills witnessed by the Board were executed with a precision and a degree of excellence which could come only from a high degree of intelligence on the part of the cadets, the most careful training, and much practice. The proficiency displayed was in the highest degree satisfactory and creditable alike to the cadets and their instructors. The practical exercises are valuable adjuncts to the theoretical instruction and are highly commended by the Board. Appliances for the proper conduct of these exercises should be liberally supplied, including modern guns and other modern instruments of offensive and defensive warfare.

The buildings, grounds, and quarters are well policed by a force sufficient in numbers. The best of order prevails, the utmost care is given to cleanliness, and in matters of police and administration no changes are recommended.

## STEAM, MATHEMATICS, PHYSICS, AND MECHANICS.

The Board gave special care to these important questions and respectfully submit the following:

(1) *Steam*.—That the machine shops be enlarged by the addition of twenty power tools, with a new stationary engine to provide increased power to operate the shop. That such a number of power hand turning lathes be added to the pattern shop as may be designated by the

of engineer. Also, that the smith shop be enlarged and a new cupola be built, and that necessary forges for the work be sent to thisiment. That new tools be added to the machine shop; also that the pattern shop be enlarged and such necessary tools be purchased for this department as may be required by the chief engineer. The new compound steam engines which have been completed and are in process of construction show great credit to the department. The Board was greatly pleased with the work shown in this department, and these suggestions of addition are made not because the work was not excellent, but because the very excellency of the work demands facilities for doing more.

(2) *Mathematics*.—The examination papers in this department show great proficiency in this branch, and we can commend in the highest degree the methods, so far as we are able to ascertain them, of teaching and explaining the principles involved in this department.

(3) *Physics*.—The Board would recommend the enlargement of the physical laboratory to provide more room for the experimental work. With the amount of work to be done the small space does not permit as many to work at a time as might be accommodated were more room provided. An addition to the physical laboratory, to cost, with the apparatus, \$55,000 would be a profitable investment for the Government. While we commend the excellence of the physical department, we are assured by those having it in charge that the best work is not possible with the limited room to which they are confined. The only estimate we have for cost is \$55,000. The Board is not prepared to say from experience whether this is more or less than is absolutely necessary, but we incline to the opinion that it is only what is necessary.

#### ENGLISH STUDIES, MODERN LANGUAGES, DRAWING, PHYSIOLOGY, AND HYGIENE.

The Board gave special scrutiny to the departments embraced in this section. The committee to whom the work was assigned had special interviews with the heads of the various departments. In reply to interrogations, reports were received, which are sent as an appendix to this report.

Referring generally to these reports, the Board desire to say that they indicate a satisfactory and careful manner of instruction, especially in that of the English department, with which the committee is particularly pleased.

In regard to the department of modern languages, the Board heartily prove of the system lately introduced, more generally known as the "ouvuer system," or a natural method of instruction in French. They ve that excellent results are being obtained, and that the naval sts are acquiring a sound knowledge of, and a power of fluent ex-ion in, this language not previously attained.

With reference, however, to the subject of Spanish, which has hitherto regarded as an elective study, they are of the opinion that more nence ought to be given to the study of this language, for it seems that the cadets can not obtain more than a mere outline of the e by means of the course at present pursued. In view of the ant so many naval stations are situated on the South American they are of the opinion that a more perfect knowledge of this should be regarded as a matter of vital importance.

ards the course in German, which is also pursued as an elect-y, the Board understand that no appropriation has been made

for providing instruction in this branch. They would therefore recommend that the same amount be paid to the professor of this language as is already provided for and paid for instruction in Spanish.

Lastly, in the department of physiology and hygiene, the Board endorse and recommend the adoption of the suggestion made by Dr. Henry G. Beyer, that inasmuch as "physiology, like chemistry, has become an experimental laboratory, science and books alone no longer serve the purpose of instruction, an appropriation of \$500 would do great and permanent good in this department."

They have no recommendations to make in regard to the department of drawing, which appears to be most satisfactorily conducted, beyond that made by Lieut. H. O. Rittenhouse, the head of the department, to the effect that greater efficiency might be secured if more time were allotted for instruction in the art. The Board, however, are aware of the difficulty experienced, probably in all departments, of securing more time in any one direction.

#### LIBRARY.

The library is in good condition and conveniently arranged. It contains 32,303 volumes, the increase during the last year being 1,000 volumes. The books have been well selected. The amount appropriated is adequate for the purchase of selections of the best literature of the day, of recent publications on naval science and marine warfare, and other professional and technical works.

The Board renew the recommendation of the Board of last year that the restriction on the binding of books in effect, that no binding shall be done in any department of the Government except in plain sheep or cloth, be removed, and the library of the Academy placed in this respect upon an equality with the Congressional Library, the library of the Surgeon-General, and the library of the Patent Office, and recommends an annual appropriation of \$500 for the purpose of the binding and repair of books.

A letter from the librarian to the committee containing information and recommendations concerning the library is hereto attached as an appendix.

After a conference with the superintendent and a discussion of the subject, the Board unanimously resolved that, in the opinion of the members, the custom of granting special leaves of absence to cadets should be discontinued. They believed, however, that leaves for a few hours, without permission to go beyond the precincts of the city of Annapolis, might be given.

In concluding the report, the Board desire to place on record their appreciation of the tone, discipline, thoroughness, thoughtfulness, and care shown by the officers in their conduct of this splendid institution. The traditions of the Academy, and the hopes of the Government in its maintenance, have faithful interpretation in the labors of Capt. Phythian and the gallant and accomplished gentlemen associated with him. The Board commend their labors to the recognition of the Department and of Congress.

HILARY A. HERBERT,  
*President.*

## APPENDIX.

### DEPARTMENT OF ENGLISH STUDIES, HISTORY, AND LAW, U. S. NAVAL ACADEMY,

*Annapolis, Md., June 2, 1892.*

MY DEAR SIR: I have the honor, in answer to your note of the 30th ultimo, to lay before your committee information regarding the course pursued by the cadets in this department, as follows:

The scope of studies is limited by the time that can properly be allotted to each department, when taking into consideration the range of subjects that should find place in the course of four years that the cadets remain at the Academy, prior to the two years' service afloat required to complete the course of six years.

The clippings from the Naval Academy Register for the year 1891-'92, pasted hereon (pages 3 and 4), give a comprehensive view of the course pursued.

#### *Course of instruction.*

[Reference books are marked thus (\*).]

#### FIRST YEAR—FOURTH CLASS.

##### FIRST TERM.

Department.	Number of recitations a week.	Number of months.	Subjects.	Text-books.
English studies, history, and law.	2	4	ENGLISH: The structure and historical development of the English language; syntax; analysis of sentences; punctuation and capitals; exercises in the composition of letters.	Whitney's Essentials of English Grammar. Hart's Punctuation. Webster's Dictionary.*
	3	4	HISTORY: Outlines of history, especially the history of Greece and Rome, and of the states of western Europe; historical geography; important points in naval history, by notes or lectures.	Swinton's Outlines of the World's History. Labberton's Historical Atlas.*

##### SECOND TERM.

English studies, history, and law.	2	4	ENGLISH: Rhetoric and composition; choice and use of words; kinds of composition; narration and description; argumentative composition; exercises in the composition of letters and telegrams. Themes.	A. S. Hill's Rhetoric.
	3	4	HISTORY: Progress of colonial development in America, and the history of the United States; important points in the naval history of the United States, by notes or lectures.	Elliot's History of the United States. Mitchell's Atlas.*



*Course of instruction—Continued.*

## SECOND YEAR—THIRD CLASS.

## FIRST TERM.

Department.	Number of recitations a week.	Number of months.	Subjects.	Text-books.
English studies, history, and law.	2	1	ENGLISH: Classification of words; definition of words by usage and by derivation; synonyms; laws of change in the meaning of words; faults in diction and their remedies; selection and arrangement; elementary principles of reasoning; principles of composition; exercises in the composition of official dispatches, letters, and telegrams. Themes.	Abbott and Seeley's English Lessons for English People. Abbott's How to Write Clearly. Ayres's Orthoëpist.* Ayres's Verbalist.* Webster's Dictionary.*
	2	4	LAW: The Constitution of the United States.	Andrews's Manual of the Constitution.

## FOURTH YEAR—FIRST CLASS—LINE DIVISION.

## SECOND TERM.

English studies, history and law.	2	4	INTERNATIONAL LAW: The objects, sources, and sanctions of international law; the laws of war, embargo, reprisal, and retortion; blockade; contraband of war; right of search; ship's papers and nationality; prizes; privateering; piracy; the rights and duties of neutrals; jurisdiction over vessels at sea and in territorial waters; fugitives and deserters; licenses to trade; recaptures.	Glass's Marine International Law. Woolsey's International Law.
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The details of the instruction given comprise, in addition to the matter of the text-books, many notes for teaching practical English, and for calling attention to common faults in speaking and writing, upon which instruction is freely given.

Much attention is given to pronunciation, and to noting the weight of authority in cases of divided usage by reputable orthoëpists.

The exercises in the composition of letters, official dispatches, and telegrams, as well as the required written themes, afford opportunity for practical teaching in English.

In history, the text-books are supplemented with notes and with convenient tables prepared for assisting the cadets in comparing events.

In international law, copious notes are added to the text itself.

In spelling, the cadets are drilled with the view of fixing in their memory the correct spelling of words that they have misspelled in every written exercise, including those on the blackboard.

They are required to make written reports once a week, citing the correct spelling of those words (misspelled since the date of the latest report), and are prohibited the giving of the incorrect spelling, even though useful for comparison, since this would tend to perpetuate the errors.

Having due regard to the claims of all the subjects that should be taught in the course of the several departments, I am unable at this time to recommend any change in the course of the department considered here, which, upon careful consideration, has been laid out as most nearly attaining the end of neglecting as little as possible of the essential training.

It is to be regretted, however, that the time will not permit a further advance in the treatment of the subjects pertaining to this department.

I beg leave to thank you and the committee for giving up your much-occupied time to my oral explanation of the working of the department, since taking note of every detail would be impracticable in this written report.

I have the honor to be, sir, very respectfully, your obedient servant,

J. E. CRAIG,

Commander, U. S. Navy, Head of Department,

Right Reverend CHARLES TODD QUINTARD,

Chairman Committee Board of Visitors on English Studies.

DEPARTMENT OF MODERN LANGUAGES,  
U. S. Naval Academy, May 31, 1892.

MY DEAR SIR: I have to acknowledge receipt of your note of the 30th instant, requesting to be furnished with details relating to our course in modern languages, text-books used, etc. In compliance with your request I shall take pleasure in giving you all the information in my power.

The system of instruction pursued at the Academy is that of the so-called "natural method." This method has been so fully explained by various authors and so much has been written on the subject that I should be able to add but little to what has already been said; I will therefore confine myself chiefly to our practices at this place in the use of the system.

The time devoted to modern languages at the Naval Academy comprises: Five periods a week during both terms of fourth class year, three periods a week during first term of third class year, two periods a week during second term of third class year, two periods a week during first term of second class year, one period a week during second term of second class year.

The one period a week of the second term of the second class year and one of those of the first term consist of Friday evenings from 7:30 to 9:30. For these recitations no lesson is prepared.

It is a matter of regret to us that we are obliged to take in our department the first part of the course instead of the last part as was formerly the case. The demands of the scientific and professional branches have so increased that languages have been crowded out of the higher into the lower classes. Much time is therefore wasted on the very dull of the fourth class, many of whom pass out at the end of the first term and many others at the end of the first year.

While we have in our course here the three languages, French, Spanish, and German, the first named only is required in the course, the other two being elective and allowed to be taken only by those who are proficient not only in French, but also in their other studies. The time devoted to Spanish and German, the "advanced course," as it is called, is a part of the time allowed to the department as given above, those who take this course being obliged to cover in French in the diminished time the same ground as the remainder of the class. For instance, Spanish and German are begun at the beginning of the second term of the fourth class year, two recitations a week being devoted to these languages and three to French. The number of cadets of last year's fourth class allowed to take the advanced course was 25, and for the year preceding 30. The number of those taking Spanish is generally somewhat in excess of those taking German. What is said subsequently will refer particularly to French, though our practice as to Spanish and German differs only in minor details, depending on the text-books used. It is the natural method throughout.

Our present text-books are as follows, viz:

FRENCH.

*Fourth class, first term.*—La Parole Française; Sauveur & Van Daell. Bellow's French Dictionary. Verbs from printed sheets (prepared under my direction by Prof. Marion, of the department).

*Fourth class, second term.*—La Langue Française, 1<sup>e</sup> partie, Paul Bercy. Le Conscrit de 1813.

*Third class, first and second terms.*—La Langue Française, 2<sup>e</sup> partie, Paul Bercy. Bocher's French Comedies. Petite Grammaire Française, Sauveur.

*Second class, first term.*—Professional Reader, for use of naval cadets.

*Second class, second term.*—Le Courrier des États-Unis. Edition du Dimanche (subscription for each cadet).

Probably the best explanation of our method of proceeding with the different classes can be obtained from the orders on the subject, posted on my bulletin board at the beginning of the year for the guidance of the instructors. They are as follows:

"INSTRUCTIONS OF FOURTH CLASS."

"(1) *Conversation*—(Questions on subject matter of lesson).—Spanish: Fourth class, First Spanish Book, Sevane's Dictionary; Third class, Ibarra's English, method. German: Fourth class, Dreysprung's Cumulative Method, Dreyer's Verb Drill, Weukebach und Schrakamp's Deutsche Grammatik, Whitney's Dictionary.

*Third class, same as in fourth class; also, Jeffcott and Tossell's German Newspaper and Review. First try questions made up by yourself of words occurring in the lesson or which have been seen before. If this fail, use the questions of the book. Encourage the cadets to talk. If there is any particular*

word that the cadets do not understand, write it on the blackboard; they will often know the word, but fail to understand pronunciation. If the cadet reciting does not understand, pass the question to the next, and so on. If none understand, explain in French. In this way, all must pay attention and time is saved.

"(2) *Verbs*. As soon as each cadet has recited send him to the board and make him write the five primitive parts and then one or more particular tenses of verb, indicating by arrowhead how derived. Always have ending written a little apart from root of verb. As soon as last cadet has recited, correct mistakes (asking section to point them out) and have verbs rubbed out.

"(3) *Correction of written exercises*.—After finishing the verbs, send entire section to board and give out in turn sentences of exercise until all have been given out. Then have cadets take seats and sentences on board read in order, section correcting and then correcting their written exercises from board. Any mistakes left in exercise will be counted against writer. The exercises will not be examined during recitation, but immediately afterwards.

"Allow sufficient time to explain the new lesson, and endeavor to explain every new word.

"The general idea of this plan of instruction is not to hear one cadet at a time, but to keep all busy, and to utilize every moment.

#### "INSTRUCTION OF THIRD CLASS.

"Let each cadet read and then relate in French, in his own words, what he has read, or converse with him on this or kindred subjects, also asking the English of any idiomatic phrases or expressions. Then ask a grammatical question from the questions of Bercey or from the lesson in the "Petite Grammaire." Verbs may be asked at any time.

"After reciting, give each cadet several sentences of exercise (English into French) to write on board. After all have recited, by which time entire exercise will have been given out, let each cadet in turn read his sentences and have section correct, at the same time correcting their exercises from the board. The exercises will then be handed in and cadets will be responsible for remaining mistakes.

"The days of the comedy (one recitation a week) dictate for ten minutes and then let them correct one another's dictation with open books, marking number of mistakes and name of corrector. Mistakes uncorrected count against corrector.

All conversation in French.

#### "INSTRUCTION OF SECOND CLASS.

"*Mondays, French reader*.—Make each cadet read and then repeat in French, in his own words, what he has read, or put questions to draw him out. Require the English of any technical or idiomatic words or phrases. Attend carefully to pronunciation.

"*Friday evening, dictation and conversation*.—The dictation will be taken from the lesson of Monday and is to be written with ink and corrected with pencil. The name must be written at top of each sheet and exercise submitted and signed at end. After dictation the cadets will exchange papers and correct mistakes with books open, then mark number of mistakes at bottom with name, and word corrector added.

"After correction of dictation, converse on general subjects. All conversation in French."

The most comprehensive idea of our work and what is accomplished under the system will be obtained by an examination of the copies, herewith inclosed, of the whole series of monthly, semiannual, and annual examinations given during the last academic year. Ten questions are given in each paper, comprising dictation, verbs, grammar, and narrative. From the beginning the answers, like the questions, are written entirely in French.

The semiannual and annual examinations comprise an oral as well as a written examination.

The "natural method" of teaching languages has appealed to me from the first as being thoroughly logical and based on common sense. Experience has confirmed me in my opinions. The great gain in conducting recitations entirely in the foreign language—making it the language of the class room—as compared with the old system, where perhaps a dozen words of English were spoken to one of the language taught, seems quite evident, and especially so now that the importance of educating the ear is so fully recognized.

In learning a foreign language, that part which cannot be acquired by one's self is the speaking, the pronunciation, and the training of the ear. Translation, grammar, and writing or composition it is quite possible to acquire by means of books and without other assistance. It seems wise, therefore, that we should endeavor to give to our pupils that which they cannot acquire by themselves, and that which is therefore of most importance in their subsequent more thorough acquirement of the

language on obtaining more leisure to devote to its study, or on going abroad and enjoying opportunities to speak it. The natural method inculcates the habit of thinking in the foreign language, so necessary to fluent speaking.

The system seems to me especially adapted to this place, where we have a large corps of instructors and consequently small sections, thus allowing a great amount of individual instruction and conversation; and also because speaking and understanding are especially valuable to our graduates, since they have exceptional opportunities to make practical use of their languages during their long cruises in foreign lands.

It is to be regretted that we can not carry our instruction through the first-class year, in order that the cadet may leave the Academy with his languages fresh in mind.

Under the system much depends upon the personality of the instructor, and this is especially so in the beginning. There are few teachers like Prof. Sauveur, who is the great exponent of the method.

I understand that the "natural method" has been adopted by many progressive institutions of learning. I believe it to be the conviction here that the results obtained under it are clearly better than under the old system, and we consider it firmly established at this place.

Trusting that I have not been too prolix, and that you may find in what I have written such information as you may desire, I have the honor to be, with great respect, very truly, yours,

ROBERT G. PECK,

*Lieut., and Head of Department of Modern Languages.*

RT. REV. CHARLES TODD QUINTARD,  
*Chairman Committee Board of Visitors on Modern Languages.*

BRANCH OF PHYSICAL TRAINING,  
NAVAL ACADEMY,  
Annapolis, Md., June 1, 1892.

SIR: Agreeably to your request of May 30, to furnish you with some information with regard to the instruction in physiology and hygiene given to the cadets of the Academy, would say: (1) This course consists in lectures and examinations on anatomy, physiology, and hygiene, with two introductory lectures on general biology for a foundation. (2) By the time the cadets have acquired sufficient knowledge of these subjects to appreciate them, lectures on the influence of healthful exercises and of alcoholics and other narcotics are introduced. (3) For the first time this year several lectures and demonstrations on "First aid to the injured" and on the "Transportation of the wounded" have been introduced.

So far as I can judge the subject-matters of this department are much appreciated by the cadets.

As a text-book of physiology and hygiene, Prof. Martin's book entitled *The Human Body* is used.

With regard to any suggestions which would tend to promote the efficiency of this department, I can not too strongly insist that a supply of physiological instruments be allowed for purposes of demonstrations. Physiology, like chemistry, has become an experimental laboratory; science and books alone no longer serve the purpose.

An appropriation of \$500 would do great and permanent good in this department, the money to be expended exclusively for physiological instruments to be used for purposes of demonstrations during the lectures.

I would be very glad to have you visit my workshop, and to give you or show you some more practical results of our work.

I am, very respectfully, yours,

HENRY G. BEYER,

*Passed Assistant Surgeon in Charge of Physical Training.*

REV. CHARLES TODD QUINTARD,  
*Chairman on Physiol. and Hygiene, Board of Visitors.*

DEPARTMENT OF MECHANICAL DRAWING,  
U. S. Naval Academy, May 31, 1892.

MY DEAR SIR: Referring to your note of the 30th May, I have the honor to say that instruction in drawing begins in the third class (second year of the course), and during the first term of the academic year four periods per week are assigned to the class in this subject. A session of two hours constitutes a period. During the second term of the year but three periods per week are assigned to the class. The course contemplates instruction in mechanical drawing solely. The subject of pro-

jections, being a necessary element in drawings of this kind, is covered here by a substantial course in descriptive geometry drawing, the time coming out of the periods above mentioned.

It is the object of the first year's course to teach the use of the instruments, the effect of different qualities of line, and the many conventions familiar to the draftsman. Briefly, this year's work is an apprenticeship, in which the student learns the details of the subject as developed from a scientific foundation.

The second class (third year of the course) follows the work of the preceding year during one term of study, devoting to the subject two "periods" per week. During this brief allowance the cadets are put upon general draftsman's work, the selections for study being drawn chiefly from professional subjects, and embracing the new constructions of all kinds that are developed in the service. The chief object aimed at for the classes, as a whole, is to give them familiarity with working drawings and facility in reading and interpreting them. To this is added in a general way all that individual taste and capacity indicate as desirable, and which can be made to harmonize with the limitation of time.

The text-book used is Tomkin's Machine Construction. It should be stated, however, that this work is used more as a reference book, the definite course of instruction being yet unwritten, and embodied only in models and manuscript notes, supplemented by a few lectures.

The only suggestion relative to increasing the efficiency of this department of study which I presume to offer is the allowance of more time to the work.

Very respectfully, your obedient servant,

H. O. RITTENHOUSE,

*Lieutenant, U. S. Navy, Head of Department of Mechanical Drawing.*

Rt. Rev. C. T. QUINTARD, D. D.,

*Chairman Committee Board of Visitors on Drawing.*

U. S. NAVAL ACADEMY LIBRARY,  
*Annapolis, Md., June 1, 1892.*

GENTLEMEN: This library now contains 32,303 volumes, the increase for the last twelve months being 1,000 volumes. The annual Congressional appropriation of \$2,000 sufficiently provides for the steady, if slow, growth of the collection, and insures the purchase of all the important professional and technical books and periodicals. This appropriation is limited to the purchase of books, and cannot be used for defraying the expenses of rebinding and repair of books. Indeed it would be quite inadvisable to curtail the growth of the library by thus diverting any portion of the book fund.

In a large collection of books the question of binding and repair is a serious and increasing one, and some step should be taken to provide for this item of expense. Hitherto the cost has been met by the general appropriation for stationery and printing and binding for the Navy, but as a great many demands are always made on that appropriation, it often happens that the amount that can be spared from it is inadequate to cover the cost of needed rebinding. I would therefore recommend that an annual appropriation of \$500 be asked for for binding and repairs. This amount would be sufficient for the needs for a few years, but it will be an increasing item of expense as the library grows older and larger.

This is the only financial question needing discussion, but in the matter of the binding a little legislation would greatly help the condition and life of the books in the library.

By law all books belonging to the Departments of the Government must be rebound at the Government Printing Office, and it is further stipulated that no binding other than in cloth or half sheep shall be done in the Printing Office except for certain specified libraries, viz: Congressional, Surgeon-General's, Patent Office, and State Department. Copies of the laws relating to this matter are inclosed.

Now a cloth or half-sheep binding is always considered as a very inferior and non-durable binding, and it is not appropriate or economical for a library. The majority of libraries put only cheap novels in such binding, as it has been found by experience that half morocco wears enough longer to more than make up for the difference in first cost. There are many valuable books here that should when rebound be put in the best possible shape, and at present this cannot be done. I would therefore request that this library be put on the list of libraries that are not restricted in the quality of binding done.

Very respectfully,

A. N. BROWN.

LIBRARY COMMITTEE, BOARD OF VISITORS, U. S. NAVAL ACADEMY.

# R E P O R T

## OF THE

### CHIEF OF THE BUREAU OF YARDS AND DOCKS.

BUREAU OF YARDS AND DOCKS,  
NAVY DEPARTMENT,  
*Washington, D. C., October 15, 1892.*

**SIR:** During the past year the navy-yards and naval stations have been maintained in as good condition as the limited appropriations would permit. I regret that the deterioration has been so great, that it is not possible to keep pace with it in the way of repairs. Great permanent improvements have been made, however, in the several yards: At Portsmouth, N. H., a water system; at Boston, new pumping machinery for the dry dock, and new shears capable of lifting great weights have been ordered; at New York, an electric plant has been installed, locomotive cranes, the largest of their kind in this country, are being erected, the sea walls on cob dock rebuilt to a great extent, also many changes in the workshops, to the greater facility of carrying on the work; at League Island two magnificent piers are about completed, much grading and filling in have been done, as well as a large amount of dredging is under contract; at Norfolk, launching-ways for two ships have been built and successfully used, an immense crane is in the course of construction, extensions have been made to the shops and sea walls, an electric-light plant has been installed, and an ample supply of water obtained from a series of wells; at Port Royal, S. C., the dry dock is well in hand and should be completed in the time contracted for; at Mare Island, the sea walls are being rebuilt in a substantial manner, railroad relaid, prison greatly improved, and a new crane mounted on the water front; at Puget Sound, all the land for the station has been purchased (see report appended). Proposals were invited for building dry dock, and the bid of Byron Barlow & Co. has been accepted.

The estimate submitted by the commandants of the navy-yards are:

Repairs and preservation .....	\$809,458.05
General maintenance .....	434,572.75
Civil establishment .....	93,280.06
Improvements .....	5,169,479.75
<b>Total.....</b>	<b>6,506,790.61</b>

I have reduced them as follows:

Repairs and preservation .....	500,000.00
General maintenance .....	500,000.00
Civil establishment .....	75,658.14
Improvements .....	1,187,280.00
<b>Total.....</b>	<b>2,257,928.14</b>

There is a great necessity for a dry dock on the New England coast, capable of taking the largest battle ships. The dock at Portsmouth, N. H., is an old one, and is not safe to lift over 3,000 tons; it requires extensive repairs, which I do not think it is worth. The dock at Boston is of stone, but was built many years ago, before such immense vessels as we now have were thought of, and is not large enough to take them in. If we should get in serious trouble with some European power and an engagement should take place off the New England coast, any of our larger vessels which required dockage would be compelled to steam hundreds of miles down the coast to New York in order to have the repairs attended to. We ought to have as large a dock on that coast as we will soon have on the South Atlantic. The same could be said of the necessity of a dry dock on the Gulf coast. At the Portsmouth, N. H., navy-yard the channel between the main island and Seaveys Island could be utilized.

At the Boston yard another dock parallel to the present one should be constructed, so that the same pumping plant could serve for both. I renew my recommendation of last year that \$50,000 be appropriated to begin work on the basin at this yard.

There are now four of the navy-yards lighted by electricity, which not only increases the efficiency, but decreases the liability to fire. I recommend that the navy-yards at League Island and Boston be supplied with an electric-lighting plant. At Boston the gas mains will have to be renewed if gas is continued, for they are old and leak considerably. At League Island there are as yet no facilities for lighting, the city gas mains not extending to it.

I renew my recommendation of last year that the naval prison be removed from the Boston yard, and that one be built on Seaveys Island, part of the Portsmouth navy-yard. The prison at the Boston navy-yard is located in the end of one of the storehouses, and is unsuitable, in my opinion, in every way.

#### NAVAL HOME, PHILADELPHIA.

This institution of quiet and rest for the veterans of many years' service well deserves the name of "Home," and during the past year has afforded a comfortable abiding place for the usual number of sailors and marines who have passed the period of active service.

On July 1, 1892, 212 beneficiaries were borne on the rolls; 14 had died during the previous twelve months and 5 had been dropped from the list. The conduct of the beneficiaries has been exceptionally good, which is a convincing proof of their happy surroundings and an appreciation of the comforts enjoyed.

Commodore O. F. Stanton, U. S. Navy, has administered the affairs of the Home, as its governor, during the past year very successfully, and has kept the institution up to a high state of efficiency.

The sale of the small tract of land, about 4 acres, outside the present walls of the Home, which has been recommended in many annual reports, has not yet been accomplished.

In renewing my former recommendation for the sale it may be well to state that since right of way through the Home grounds was granted by Congress in 1885 to the Schuylkill River East Side Railroad Company, this portion of the ground is virtually a separate addition and is of no benefit to the beneficiaries. Could its present market value be utilized in erecting suitable buildings for the comfort and amusement of the inmates of the Home, the original intention of the grant

would be carried out and the deserving occupants of the Home be receiving all their allotment. Unlike any other institution in the country, this Home is supported by the income of the navy pension fund, which fund being created by the untiring vigilance of the inmates, during the periods of war in which the country has been engaged, it seems but right that liberal concessions should be made when providing for the wants and comforts of the old and disabled veterans.

The attention of the Department is especially called to the disposal of this piece of property, with the request that the necessary legislation may be asked for, and the proceeds of the sale be used in erecting and furnishing a recreation hall for the inmates of the Home.

#### CIVIL ENGINEERS.

I would again call the attention of the Department to the necessity for an increase in the Corps of Civil Engineers, in order to the prompt and economical prosecution of the work of designing, constructing, and maintaining our public works in the best manner.

The number now comprising the corps is quite inadequate for this purpose, there being a present need of two more for regular yard detail, and a further demand in prospect should a dry dock be built on the Gulf of Mexico. In addition to this there are frequent occasions requiring the services of civil engineers for special duty upon boards, inspections at private establishments, planning and superintendence of works for other Bureaus and the Marine Corps, etc., for which the civil engineers attached to the yards and stations can not always be spared.

The corps should be large enough to meet all these demands and permit of placing the construction of all the civil engineering and architectural work of the Navy Department under its supervision.

There is also pressing need for a grade of assistant civil engineers to supply intelligent professional assistance to the civil engineers on yard duty. Such assistants being commissioned officers, would have the requisite authority and status to perform any duty assigned to them in connection with the public works, and take charge of the same, and represent the civil engineer of the yard in his absence. The need of them is constant, and is only partially and in an imperfect way met by the employment of young civil engineers at many of the yards under various ratings, and paid for from regular appropriations and appropriations for public works. There would be the manifest advantage of having young officers in training, in this subordinate grade, in the line of public works under cognizance of this Bureau, to fit them in an especial degree for the vacancies occurring in the grade of civil engineers.

I would therefore recommend the necessary legislation by Congress to increase the corps to 20—12 civil engineers and 8 assistant civil engineers—the assistants to be selected from graduates of the Naval Academy showing an aptitude for civil engineering, and given a course in some civil engineering school. Vacancies in the grade of civil engineers to be filled by promotion from the grade of assistants after examination.

The introduction of this grade of assistants would be without additional expense to the Government, as it would obviate the necessity of employing an equal number of technical assistants under current appropriations upon the works. Such an increase and organization as indicated would greatly facilitate the work of this Bureau, add to its



efficiency, be true economy, and for the best interests of the service. It is earnestly desired that the Department will approve of such an increase of the corps, and that Congress will take favorable action.

## PORTSMOUTH, N. H.

For boiler house No. 10 (steam engineering) ..... \$45,000

The present boiler shop is beyond repair; part of it has fallen in. If it is intended to do any work in this line a new boiler shop is absolutely necessary.

## BOSTON, MASS.

For repairs of ship houses ..... \$25,000

For rebuilding wharves ..... 75,000

For installation of an electric lighting plant ..... 15,000

For dispensary building, Medicine and Surgery ..... 12,000

Total ..... 127,000

The magnificent ship houses at this yard will soon be beyond repair if something is not soon done; in addition to building vessels therein they are useful and necessary as storehouses for the storage of torpedo and other boats. The two wharves to be rebuilt have been suffered to go to decay, for want of funds, until now they are useless.

The gas pipes are in such a bad condition that they require renewal. The Bureau believes it would be better to establish an electric plant.

The dispensary is located in a badly decayed building and is not adapted to its purposes.

## NEW YORK, N. Y.

For completing entrance from Sand street and grading same ..... \$30,000

For extension of railroad tracks ..... 10,000

For construction of quay wall, Whitney basin, Whitney and Cob dock ..... 153,000

Total ..... 193,000

On September 17 the erecting shop of steam engineering was entirely destroyed by fire and some damage done to the machine shop. Steps have been taken to construct a temporary erecting shop and to repair the main building. I recommend that \$75,000 be asked for to construct a proper fireproof erecting shop, so that in future valuable machinery may be guarded against loss by fire.

Five thousand dollars was appropriated by the last session when \$35,000 had been asked for, for Sand street entrance, and the amount now required is to complete the improvement. Work will be greatly facilitated by having the railroad extended to the various shops and wharves, so that the locomotive can haul material, instead of by teams.

The extension of the quay wall is a necessity; a continuance of the appropriation for a few years will greatly increase the efficacy of this station.

## LEAGUE ISLAND, PA.

For commencing plate-bending shop ..... \$75,000

For construction of east dry-dock pier ..... 82,387

For continuation of sea wall ..... 39,600

For two new officers' quarters ..... 30,000

For railroad track ..... 18,409

For one traveling crane around dry dock ..... 50,000

For one pair sheer legs ..... 18,000

For improvement of roads ..... 15,000

For one artesian well ..... 10,000

Total ..... 338,396

I have in former report called attention to the coming importance of this navy-yard, the only one located in fresh water, so necessary for the preservation of our new navy when out of commission. I still hold to my opinion, and hope appropriations will be forthcoming, so that we shall be prepared to take proper care of our new vessels.

Already a dry dock, two fine piers, and several hundred feet of wall have been completed; more are required.

The cost of each of the new ships is several millions of dollars; such valuable property demands that arrangements should be made for its proper preservation.

## WASHINGTON, D. C.

For extension of navy-yard wall through marsh.....	\$24, 693
For new timber shed for ordnance purposes.....	7, 500
For conversion of mold-loft building into forge shop.....	8, 000
For reconstruction of forge shop with foundation for crane column.....	10, 000
For one wrecking car with 15-ton crane attachment.....	2, 500
For installation of electric lights in breech mechanism shop.....	2, 500
Total .....	55, 193

This yard is principally used for the manufacture of ordnance. The wall asked for is to replace a wooden fence, in order that the valuable ordnance shops may be properly protected. The other amounts asked for are to give more shop room, which is greatly needed.

## NORFOLK, VA.

For extension of quay wall.....	\$50, 000
For extension of water system .....	8, 000
For commencement of improvements to timber basin.....	45, 000
Total .....	103, 000

The extension of quay wall and improvements of timber basin are for the purpose of giving more wharf room, which is absolutely required. The water system is for the purpose of continuing the pipes to the new dry dock and upper portion of the yard.

## PENSACOLA NAVY-YARD.

There have been no vessels fitted out at this yard during the past year, nor have any improvements been made pending a decision as to whether it is to be abandoned.

## MARE ISLAND, CALIFORNIA.

For dredging.....	\$26, 282
For artesian wells .....	30, 000
For quay wall between ferry slip and stone dock .....	52, 793
For extending quay wall to coal shed .....	88, 305
For completing road to cemetery, magazine, etc .....	17, 500
For dry-air closet.....	4, 456
For new carriage house and dirt stall for Yards and docks Stables.....	3, 954
For changes in Steam Engineering building.....	4, 797
For shed for bending slabs, rolls, and furnaces.....	6, 381
For fine house for engine for construction and repair.....	3, 470
Total .....	237, 938

larger items for the quay walls are the most important. The wharves are almost useless from decay and new walls are absolutely needed for docking purposes.

The new ships can not be repaired out in the stream at anchor, as in former times. The danger of a water famine is so great in this island that an artesian well is a necessity.

#### KEY WEST, FLA.

For iron coal wharf..... \$50,000

This is to increase the facilities for supplying coal to vessels of war. There is but one wharf now; in consequence, only one ship can be coaled at a time, and the ships are much delayed.

#### PORT ROYAL, S. C.

For sewerage .....	\$846
For officers' quarters .....	7,336
For boat house .....	1,099
For barn .....	982
<b>Total .....</b>	<b>10,243</b>

It is very necessary to have quarters on the island for the naval constructor and paymaster in addition to those provided for.

#### PUGET SOUND, WASHINGTON.

For office building .....	\$3,000
For wharf .....	10,000
For two quarters for officers .....	10,000
For clearing and grading .....	5,000
For fencing part of station. ....	2,000
For artesian well .....	2,000
<b>Total .....</b>	<b>32,000</b>

At present the land has not been cleared, nor is there a building upon it, which explains the necessity of the small amounts asked for.

The increase of the number of navy-yards and stations, as well as the improvements incidental to the new Navy, added greatly to the work of the small clerical force of this Bureau. I trust you will approve of the request for typewriter copyist.

The entire amount asked for by the Bureau is \$2,367,803.14, the detail of which is contained in the tabulated sheets, Nos. 1 to 5, recapitulated as follows:

Sheet No. 1. Bureau .....	\$12,080.00
Sheet No. 2. Maintenance and contingent .....	520,000.00
Sheet No. 2. Repairs and preservation.....	500,000.00
Sheet No. 3. Naval Home .....	77,795.00
Sheet No. 4. Improvements and increase of Navy .....	1,187,270.00
Sheet No. 5. Civil establishment .....	70,658.14
<b>Total .....</b>	<b>2,367,803.14</b>

The statement showing the amount expended under each specific head of appropriation during the fiscal year ending June 30, 1892, and the balance remaining unexpended June 30, as required by section 429, Revised Statutes, is appended.

Accompanying this report is an abstract of offers for special objects of improvement and supplies coming under the cognizance of the Bureau of Yards and Docks, made in conformity to act of Congress approved March 3, 1843.

Also a report showing the amount expended during the fiscal year ending June 30, 1892, from appropriations pertaining to this Bureau for civilians employed on clerical duty or in any other capacity than as ordinary mechanics and workmen at the several navy-yards, with

~~ALL INFORMATION CONTAINED HEREIN IS UNCLASSIFIED~~  
~~DATE 03-11-2001 BY 60322 UCBAW~~

1. *Chlorophyll a* and *Chlorophyll b* were determined by the method of Arar and Collins (1971) using a Shimadzu 1601 UV-Visible Spectrophotometer.

**SECRET**

3. 1990-1991

1. State I have the honor to acknowledge the receipt of your letter of the 11th inst. and in reply to inform you that the same has been forwarded to the proper authorities for their consideration.

[illegible][illegible]

The deeds...

Very Respectfully,

U.S. "Imports."

Director, U.S. Department of Justice

Hon. B. F. TRACY,  
Secretary of the Navy.

**No. 1.**—*Report of expenditures at mark-yards, stations, and Naval Home for the year ending June 30, 1882.*

Yard- and station.	Appropriations.					Total.
	Yard improvements and Naval Home.	Repairs and preservation.	General maintenance.	Civil establishment.	Con- tin- gent.	
Portsmouth, N. H.	\$42,526.75	\$15,802.75	\$23,730.48	\$0,510.50		\$82,569.48
Boston, Mass.	57,891.88	21,686.33	20,151.10	5,300.28		104,930.59
New London, Conn.		5,328.03	0,628.07			5,956.10
New York, N. Y.	167,345.80	87,812.91	45,860.51	11,400.43	\$0,470.00	\$312,890.65
League Island, Pa.	185,274.71	25,531.20	18,541.30	1,700.00		\$230,047.21
Washington, D. C.	6,192.80	27,869.15	21,005.35	4,700.00	0,500.00	\$59,267.30
Worfolk, Va.	74,651.59	59,963.48	34,710.56	7,350.71		\$166,676.34
Panama, Fla.		8,403.46	11,305.95	1,000.00	10.00	\$20,719.41
Marine Island, Cal.	83,274.80	49,518.97	47,105.18	12,700.00	600.00	\$193,198.95
Sackett Harbor, N. Y.			56.50	300.00		\$356.50
Key West, Fla.	717.75	1,500.78	1,959.31	600.00		\$4,777.84
Naval Home, Pa.	65,180.36					\$65,180.36
Great Erie, Pa.			50.00		500.00	\$550.00
Fort Royal, S. C.	165,067.25	3,114.11	3,263.45			\$171,444.81
Puget Sound, Wash.	9,567.25		176.00		1,100.11	\$10,843.36
<b>Total</b>	<b>\$58,611.09</b>	<b>\$26,259.97</b>	<b>\$17,446.91</b>	<b>\$7,206.61</b>	<b>\$1,070.11</b>	<b>\$109,594.69</b>

## No. 2.—Detailed report from navy-yards and stations of expenditures under "Repairs and Preservation" during the fiscal year ending June 30, 1892.

Objects.	Porta- mouth.	Boston.	New Lon- don.	New York.	League Is- land.	Washing- ton.
Yard buildings .....	\$3,351.34	\$10,315.51	\$126.40	\$60,698.61	\$5,347.98	\$14,161.79
Officers' quarters .....	1,550.04	3,553.65	2,947.71	3,566.28	4,515.72	2,741.46
Wharves, bridges, landings, and boats .....	2,791.40	89.75	125.17	15,191.73	4,773.08	59.95
Roads, walks, gutters, and drains .....	3,485.18	1,631.59	1,817.50	4,800.57	4,528.92	2,487.06
Fences and walls .....	55.44	88.03	309.25	858.52	225.04	600.49
Cranes, scows, and derricks .....				9,680.00	80.21	51.54
Furnaces, forges, heating apparatus, etc .....	1,239.92	2,210.31		943.10	845.60	2,763.68
Tracks and scales .....	18.00	4,025.70		4,312.17		1,858.98
Water, gas works, and elec- tric-light works .....	203.20	1,391.62		4,852.38	371.51	2,255.18
Dredging and scowling .....				158.12		
Dry docks .....	174.92	373.18		1,313.59	127.13	
Miscellaneous repairs .....	2,933.31	4.99		11,437.84	4,576.01	74.15
Repairs to dikes .....						
Coal .....						
National holiday .....						317.92
Total .....	15,802.75	23,686.33	5,326.03	87,812.91	25,391.20	27,809.15

Objects.	Norfolk.	Pensacola.	Mare Is- land.	Key West.	Port Royal.	Total.
Yard buildings .....	\$6,524.90	\$1,709.61	\$14,571.60		\$87.90	\$36,835.64
Officers' quarters .....	1,403.46	1,340.29	2,717.77	\$48.00	2,762.74	27,199.13
Wharves, bridges, landings, and boats .....	8,549.09	650.11	2,592.72			34,823.00
Roads, walks, gutters, and drains .....	2,567.80	734.10	5,638.36		50.00	27,741.06
Fences and walls .....	978.00	450.14	273.34		10.00	3,848.25
Cranes, scows, and derricks .....	8,245.48	427.89	157.46			18,642.58
Furnaces, forges, heating apparatus, etc .....	478.19	145.36	11,050.08			20,676.24
Tracks and scales .....	22.00		11.62			9,745.47
Water, gas works and elec- tric light works .....	949.35	469.49	2,090.42	342.50	148.65	13,074.25
Dredging and scowling .....			163.92			322.09
Dry docks .....	1,834.24	56.18	1,078.34	87.03		5,074.61
Miscellaneous repairs .....	19,401.37	2,306.77	9,003.34	1,083.25	54.82	50,875.85
Repairs to dikes .....						
Coal .....						
National holiday .....		113.92				481.84
Total .....	50,983.88	8,403.86	49,348.97	1,560.78	3,114.11	299,239.97

## No. 3.—Detailed report of expenditures under "General Maintenance" received from yards and stations during the fiscal year ending June 30, 1892.

Objects.	Porta- mouth.	Boston.	New London.	New York.	League Island.	Washing- ton.	Norfolk.
Freight and transportation ..	\$11.62		\$276.32	\$7.96	\$399.69		
Printing, stationery, and ad- vertising .....	410.34	\$211.37	3.00	1,531.41	343.84	\$116.83	\$296.79
Books, maps, models, and drawings .....		108.81		66.90	146.70	11.12	127.72
Purchase and repair of fire- engines, hose, etc .....		17.84		1,020.36	100.88	51.23	1,194.39
Machinery of every descrip- tion and patent rights .....		226.26		1,285.29	272.19	18.59	2,367.75
Repairs on steam engines and attendance on same .....	66.56	95.49		1,021.61	22.10		335.37
Purchase and maintenance of oxen and horses, pay of hired teams, etc .....	3,682.60	4,256.48	856.54	4,586.05	5,812.27	3,941.61	4,412.27
Carts, timber wheels, and tools of every description ..	1,158.61	1,897.15		1,702.55	447.44	1,302.93	3,257.66
Postage on letters on public service, telegrams, and tele- phones .....	60.00		187.50	12.00	40.88	20.00	
Furniture for Government houses and offices in navy- yards .....	1,893.21	649.32		3,549.15	1,768.15	5,074.50	1,724.29

No. 3.—Detailed report of expenditures under "General Administration" and "Outfitting."

Object.	Portsmouth.	Boston.	New London.	New York.	League Island.	Washington.	Norfolk.
Coal and other fuel.....	\$ 1,072.34	\$ 144.00	\$ 200.00	\$ 1,000.00	\$ 700.00	\$ 1,400.00	\$ 1,000.00
Candles, oil, and gas.....	1,200.00	400.00	50.00	1,000.00	1,000.00	1,400.00	1,000.00
Cleaning and repairing of yards and care of buildings.....	1,000.00	1,000.00	1,400.00	1,000.00	1,400.00	1,000.00	1,400.00
Attendance on fire engine.....	1,000.00	1,000.00	30.00	1,000.00	1,000.00	1,000.00	1,000.00
Incidental labor not chargeable to other appropriations.....	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
Water tax.....	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
Tolls and ferrage.....	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
Pay of watchmen.....	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
Flags, awnings and packing boxes.....	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
Rent of landings.....	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
Rent of office quarters Philadelphia, Pa.....	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
Miscellaneous.....	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
Total.....	\$ 10,000.00	\$ 10,000.00	\$ 10,000.00	\$ 10,000.00	\$ 10,000.00	\$ 10,000.00	\$ 10,000.00

Object.	Portsmouth.	New London.	New York.	League Island.	Washington.	Norfolk.
Freight and transportation.....	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
Printing, stationery, and advertising.....	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
Books, maps, models and drawings.....	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
Purchase and repair of fire engine, hose, and tools.....	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
Machinery of every description and put-in rigging.....	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
Repair of steam engine and attendance on same.....	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
Purchase and maintenance of axes and lowest pay of hired teams.....	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
Cars, timber, wheels and tools of every description.....	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
Postage on letters or public service telegrams and telephones.....	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
Furniture for Government houses and offices in navy yards.....	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
Coal and other fuel.....	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
Candles, oil, and gas.....	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
Cleaning and repairing of yards and care of buildings.....	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
Attendance on fire engine.....	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
Incidental labor not chargeable to other appropriations.....	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
Water tax.....	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
Tolls and ferrage.....	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
Pay of watchmen.....	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
Flags, awnings and packing boxes.....	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
Rent of landings.....	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
Rent of office quarters Philadelphia, Pa.....	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
Miscellaneous.....	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
Total.....	\$ 10,000.00	\$ 10,000.00	\$ 10,000.00	\$ 10,000.00	\$ 10,000.00	\$ 10,000.00

\*See also "General Administration" and "Outfitting."

No. 4.—*Estimates received from navy-yards, stations, and Naval Home for fiscal year ending June 30, 1894.*

Yards and stations.	Appropriations.				Total.
	Yard improvements and Naval Home.	Repairs and preservation.	General maintenance.	Civil establishment.	
Portsmouth, N. H.	\$345,000.00	\$37,000.00	\$29,700.00	\$3,298.00	\$449,998.00
Boston, Mass.	552,000.00	77,500.00	88,750.00	10,789.25	679,039.25
New London, Conn.					
New York, N. Y.	1,293,154.87	321,483.95	103,097.08	20,724.75	1,738,460.65
League Island, Pa.	912,845.97	38,613.90	34,350.00	4,278.00	990,087.87
Washington, D. C.	66,108.28	30,489.37	20,145.00	5,301.25	122,043.90
Norfolk, Va.	571,660.00	90,700.00	91,703.80	12,844.63	766,907.43
Pensacola, Fla.		82,633.44	19,047.45	2,480.00	104,160.89
Mare Island, Cal.	610,593.46	88,972.34	69,336.42	20,059.18	789,961.40
Sacketts Harbor, N. Y.		350.00		365.00	715.00
Key West, Fla.	675,000.00	4,815.05	2,713.50	600.00	683,128.55
Naval Home, Pa.	77,795.00				77,795.00
Port Royal, S. C.	33,322.17	6,900.00	16,450.00	3,360.00	60,032.17
Puget Sound, Wash.	32,000.00		9,280.00	4,180.00	45,460.00
Total.....	5,160,479.75	809,458.05	434,572.75	93,280.06	6,506,790.61

No. 5.—*Detailed estimates from yards and stations for works of improvement for fiscal year ending June 30, 1894.*

Yards, stations, and objects.	Estimates.	Total.	
PORTSMOUTH, N. H.			
Timber dry dock (for first year) .....	\$200,000.00	\$345,000.00	
Completing buildings 45-46 .....	10,000.00		
Repairs to shiphouses Nos. 45 and 53 .....	15,000.00		
Naval prison .....	75,000.00		
Steam engineering boiler house No. 10 .....	45,000.00		
BOSTON, MASS.			
Wet basin .....	150,000.00	552,000.00	
Completing steel shears .....	32,000.00		
Repair to large machine shop No. 42 .....	50,000.00		
Repairs to shops and buildings .....	45,000.00		
Repairing and rebuilding dry dock .....	125,000.00		
Repairing and preservation of shiphouses .....	25,000.00		
Rebuilding wharves .....	75,000.00		
Electric lighting .....	15,000.00		
Coal pocket .....	35,000.00		
BROOKLYN, N. Y.			
Extension to building No. 33 .....	57,029.00	1,293,154.87	
Building No. 27, general workshop, C. and R., 60 by 300 feet .....	75,240.00		
Gate on Sands street .....	30,000.00		
Building No. 28, extension to boiler shop, and erecting blacksmith and copper shop .....	272,754.87		
Quay wall from northwest boundary line to stone dry dock, 1,395 linear feet .....	125,550.00		
Improving cob dock in Wallabout Channel .....	123,250.00		
Dredging in Whitney Basin .....	40,000.00		
Dredging in Wallabout Channel .....	67,000.00		
Paving, grading, curbing, and flagging various streets .....	98,731.00		
New boundary wall .....	50,000.00		
Extension of railroad track .....	23,400.00		
Causeway across Wallabout Channel .....	96,000.00		
Constructing machine shop No. 115, 100 by 200 feet .....	79,200.00		
Quay wall inside Whitney Basin, 1,800 linear feet .....	153,000.00		
LEAGUE ISLAND, PA.			
West wall of causeway, 1,370 feet .....	135,630.00		
Three building slips, at \$35,000 .....	105,000.00		
Plate bending shop .....	75,000.00		
East dry dock pier .....	82,387.00		
400 feet of sea wall .....	39,600.00		
Pier near building slips .....	135,000.00		
Four new officers' quarters .....	60,000.00		
Two 20 and four 12 ton cranes .....	25,000.00		

## BUREAU OF YARDS AND DOCKS

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## No. 5.—Detailed estimates from yards and stations, etc.—Continued.

Yards, stations and objects.	Estimated.	Total.
LEAGUE ISLAND, PA.—Continued.		
100 feet of protection wall	\$54,382.00	
1 scow, 45 tons capacity	10,000.00	
1 driver (floating)	1,500.00	
100 k scows, at \$2,000	2,000.00	
One mud scow	1,000.00	
Commandant's office	24,750.00	
Railroad track	20,000.00	
One traveling crane around dry dock	50,000.00	
One pair shear legs	15,000.00	
100	15,000.00	
1 artesian well	15,000.00	
1 wharf	15,000.00	
1 coal house	15,000.00	
	\$212,282.00	\$212,282.00
NAVAL BOMB, PHILADELPHIA, PA.		
Support of beneficiaries, repairs, improvements, and all expenses	77,795.00	77,795.00
WASHINGTON, D. C.		
Extension of yard wall through marsh	24,000.00	
100 timber shed for ordnance purposes	1,500.00	
Conversion of mold loft building into a forge shop	1,500.00	
Reconstruction of forge shop, with foundation for crane	11,000.00	
100 wrecking car with 15-ton crane attachment	2,500.00	
Construction of store No. 10	11,500.00	
Installation of electric lights in breech mechanism shop	2,500.00	
	\$58,500.00	\$58,500.00
NORFOLK, VA.		
New shipfitter shop	25,500.00	
100 re shed between dry docks	15,750.00	
Extension to quay wall	50,000.00	
Extension to wharf south of dry docks	45,000.00	
Extension to water system	5,000.00	
Extension to electric light plant	10,000.00	
100 pairs to granite dry dock	10,000.00	
Improvement to timber basin	10,000.00	
	\$211,250.00	\$211,250.00
NAVE ISLAND, CAL.		
100 caisson for stone dock	52,000.00	
100 edging	20,000.00	
100 12-ton pillar wharf crane	4,000.00	
100 sectional dock	72,000.00	
100 tension well	30,000.00	
100 dry wall between ferry slip and stone dock	52,700.00	
Extension of quay wall to coal shed	40,000.00	
100 ring ferry slip back	60,000.00	
100 to cemetery, magazine, etc.	17,500.00	
100 roads: Extension in front of quarters through Dublin	5,400.00	
100 roads: Macadam road from sectional dock basin to timber shed	6,000.00	
100 roads: Road from timber shed to yard stables	2,500.00	
100 about quarters	13,000.00	
100 extension of railroad track	17,100.00	
100 air closet	4,450.00	
100 carriage house and dirt stalls for Y. and D. stables	7,854.27	
100 board sidewalks	5,600.00	
100 in steam engineering buildings	4,797.75	
100 k	69,500.00	
100 g timber shed, building No. 94	30,000.00	
100 r's shed	20,000.00	
100 banding slabs, rolls, and furnaces	6,201.17	
100 house for Corlies engine for C. and R.	3,470.30	
	\$610,593.46	\$610,593.46
KEY WEST, FLA.		
100 dry lot	20,000.00	
100 dry	30,000.00	
100 d	25,000.00	
100 dock	600,000.00	
	\$675,000.00	\$675,000.00
PORT ROYAL, S. C.		
	861.05	
	8,197.63	
	846.51	



## No. 5.—Detailed estimates from yards and stations, etc.—Continued.

Yards, stations, and objects.	Estimates.	Total.
PORT ROYAL, S. C.—continued.		
Fire hydrant service.....	\$2,038.31	
Repairs to wharf.....	1,980.34	
Officers' quarters.....	7,336.32	
Boathouse.....	1,079.84	
Barn.....	982.17	
Extra property.....	10,000.00	\$33,322.17
PUGET SOUND, WASH.		
Office building.....	3,000.00	
Wharf.....	10,000.00	
Two quarters for officers.....	10,000.00	
Clearing and grading.....	5,000.00	
Fencing part of station.....	2,000.00	
One artesian well.....	2,000.00	\$2,000.00
Grand total.....		5,169,479.75

## No. 6.—Detailed estimates from navy-yards and stations for "repairs and preservation" for the fiscal year ending June 30, 1894.

Objects.	Ports-mouth.	Boston.	New York.	League Island.	Washington.	Norfolk.
Yard buildings.....	\$25,000.00	\$40,000.00	\$103,314.95	\$10,510.90	\$9,104.37	\$47,000.00
Officers' quarters.....	2,500.00	2,500.00	6,852.00		2,000.00	12,000.00
Wharves, bridges, landings, and boats.....	5,000.00	5,000.00	15,630.00		200.00	3,700.00
Roads, walks, gutters, and drains.....	1,500.00	7,500.00	42,200.00		6,000.00	10,000.00
Fences and walls.....	2,000.00	1,000.00	6,535.50	335.00	885.00	1,500.00
Cranes, scows, and derricks.....	3,000.00	1,000.00	24,000.00	910.00	250.00	5,000.00
Furnaces, forges, heating apparatus, etc.....	2,000.00	2,000.00	8,603.00	558.00	5,000.00	1,200.00
Tracks and scales.....		5,000.00	1,589.00	300.00	4,500.00	1,500.00
Water, gas works, and electric light works.....	1,000.00	1,500.00	340.00		2,500.00	1,800.00
Dredging and scowling.....		5,000.00	44,000.00			2,000.00
Dry docks.....	20,000.00	2,000.00	1,219.50			
Miscellaneous repairs.....	5,000.00	5,000.00	7,200.00		50.00	5,000.00
Dikes.....				20,000.00		
Cistern.....						
Coal.....						
Total.....	67,000.00	77,500.00	321,483.95	38,613.90	30,489.37	90,700.00

Objects.	Pensacola.	Mare Island.	Sacketts Harbor.	Key West.	Port Royal.	Total.
Yard buildings.....	\$8,880.21	\$32,037.81	\$250.00	\$337.50	\$800.00	\$313,235.74
Officers' quarters.....	8,058.19	10,032.61		450.00	1,000.00	45,392.80
Wharves, bridges, landings, and boats.....	24,822.42	1,950.00		482.50	500.00	57,284.92
Roads, walks, gutters, and drains.....	1,302.82	21,820.37	100.00	742.25	600.00	91,705.44
Fences and walls.....	3,159.02	1,893.00		906.00	700.00	18,913.52
Cranes, scows, and derricks.....	2,136.31	1,925.60			400.00	38,622.00
Furnaces, forges, heating apparatus, etc.....	615.82	5,448.52			300.00	25,725.34
Tracks and scales.....	825.56	531.76			1,000.00	15,246.62
Water, gas works, and electric light works.....	1,769.21	4,332.58			1,000.00	14,241.79
Dredging and scowling.....	15,720.00	500.00				67,220.00
Dry docks.....	13,750.57	500.00				37,470.07
Miscellaneous repairs.....	1,593.31	8,000.00		1,896.80	600.00	34,340.11
Dikes.....						20,000.00
Cistern.....						
Coal.....						
Total.....	82,633.44	88,972.34	350.00	4,815.05	6,900.00	809,458.05

*7.—Detailed estimate for "general maintenance" received from yards and stations for the fiscal year ending June 30, 1894.*

Objects.	Portsmouth.	Boston.	New York.	League Island.	Washington.	Norfolk.
Freight and transportation	\$500.00	\$250.00	\$1,000.00	\$100.00	\$50.00	\$100.00
Printing, stationery, and advertising	500.00	400.00	1,800.00	350.00	300.00	500.00
Books, maps, models, and drawings	100.00	500.00	1,750.00	200.00	25.00	1,000.00
Purchase and repair of fire engines	500.00	500.00	7,000.00	1,000.00	150.00	850.00
Machinery of every description and patent rights	500.00	3,000.00	6,800.00	2,000.00	200.00	17,500.00
Repairs on steam engines and attendance on same	1,500.00	500.00	6,200.00	1,500.00	500.00	6,680.00
Purchase and maintenance of oxen and horses, pay of hired teams, etc.	5,000.00	7,500.00	20,082.50	4,500.00	5,000.00	14,415.00
Carts, timber wheels, and tools of every description, and repairs of same	5,000.00	2,500.00	7,075.00	2,500.00	2,500.00	9,500.00
Postage on letters on public service and telegrams	25.00	50.00	500.00	100.00	20.00	25.00
Furniture for Government houses and offices in navy-yards	1,500.00	2,000.00	4,200.00	8,000.00	1,500.00	7,000.00
Coal and other fuel for yards and docks	3,000.00	3,000.00	7,120.00	2,000.00	2,000.00	2,760.00
Candles, oil, and gas	1,000.00	2,500.00	1,624.00	200.00	1,000.00	2,650.00
Cleaning and clearing up yards and care of buildings	2,000.00	4,500.00	8,721.76	4,200.00	5,000.00	5,760.00
Attendance on fires, lights, fire engines, and apparatus	3,500.00	2,000.00	7,486.82	4,200.00	150.00	3,676.00
Incidental labor, not chargeable to other appropriations	1,000.00	2,500.00	5,304.00	1,000.00	1,500.00	6,000.00
Water tax and ice		3,000.00	6,000.00			1,500.00
Tolls and ferrage	25.00		200.00			50.00
Pay of watchmen	4,000.00	4,000.00	9,855.00	1,500.00		11,504.80
Flags, awnings, and packing boxes	50.00	50.00	378.00	1,000.00	250.00	232.50
Rent of landings						
Miscellaneous supplies						
<b>Total</b>	<b>29,700.00</b>	<b>38,750.00</b>	<b>103,097.08</b>	<b>34,350.00</b>	<b>20,145.00</b>	<b>91,703.30</b>

Objects.	Pensacola.	Mare Island.	Key West.	Port Royal.	Puget Sound.	Total.
Freight and transportation	\$25.00	\$2,000.00	\$200.00	\$100.00		\$4,325.00
Printing, stationery, and advertising	275.00	500.00	20.00	200.00		4,845.00
Books, maps, models, and drawings	56.00	100.00		100.00		3,831.00
Purchase and repair of fire engines	1,394.50	1,000.00		250.00		12,644.50
Machinery of every description and patent rights	195.00	500.00		500.00		31,195.00
Repairs on steam engines and attendance on same	1,181.00	2,416.80		2,000.00		22,477.80
Purchase and maintenance of oxen and horses, pay of hired teams, etc.	1,650.38	9,805.70		1,000.00		68,953.58
Carts, timber wheels, and tools of every description, and repairs of same	775.00	800.00	8.00	600.00		31,258.00
Postage on letters on public service and telegrams		300.00	12.00	100.00		1,132.00
Furniture for Government houses and offices in navy-yards	841.00	3,000.00		3,000.00		31,041.00
Coal and other fuel for yards and docks	228.90	14,400.00		1,000.00		35,508.90
Candles, oil, and gas	378.00	4,297.60	122.50	600.00		14,372.10
Cleaning and clearing up yards and care of buildings	1,650.48	10,829.72	200.00	1,500.00		44,370.96
Attendance on fires, lights, fire engines, and apparatus	2,425.76	6,132.00		800.00		30,370.58
Incidental labor, not chargeable to other appropriations		1,000.00		1,600.00	\$2,820.00	22,724.00
Water tax and ice	196.00	6,900.00	146.00	400.00		18,142.00
Tolls and ferrage	60.00	2,000.00		400.00		3,635.00
Pay of watchmen	7,504.40	2,204.60	1,995.00	2,200.00	1,460.00	46,223.80
Flags, awnings, and packing boxes	202.03	250.00	10.00	100.00		2,522.53
Rent of landings						
Miscellaneous supplies					5,000.00	5,000.00
<b>Total</b>	<b>19,047.45</b>	<b>69,336.42</b>	<b>2,713.50</b>	<b>16,450.00</b>	<b>9,280.00</b>	<b>434,572.75</b>

No. 8.—*Report showing amount expended during the fiscal year ending June 30, 1892, from appropriations pertaining to the Bureau of Yards and Docks for civilians employed on clerical duty or in any other capacity than ordinary mechanics and workmen at the several navy-yards, and submitting estimates for such civilian employes for the fiscal year 1894, in compliance with the third section of naval appropriation act approved January 30, 1885 (for a year of 365 days).*

Navy-yards and rating, and rate of pay.	Amount paid to civilians employed during the fiscal year ending June 30, 1892.	Estimates for civilian employees for the fiscal year ending June 30, 1894.	
		Rate of pay.	Amount.
PORTSMOUTH, N. H.			
Clerk, at \$1,400 per annum	\$1,400.00	\$1,400.00	\$1,400.00
Mail messenger, at \$2 per diem*	732.00	2.00	730.00
Messenger, at \$600 per annum	600.00	600.00	600.00
Foreman laborer, and head teamster at \$1*	1,464.00	4.00	1,460.00
Pilot, at \$3 per diem	1,098.00	3.00	1,095.00
Janitor, at \$600 per annum	600.00	600.00	600.00
Foreman mason, when required, at \$4.50 per diem	625.50	4.50	1,408.50
Draftsman, at \$4 per diem	304.00		
Leveler, at \$4 per diem	60.12		
Quartermen brick mason, at \$3.76 per per diem	60.08		
Two quartermen laborers, at \$2.48 each	525.70		
Total	7,478.40		7,283.50
BOSTON, MASS.			
Clerk, at \$1,400 per annum	1,400.00	1,400.00	1,400.00
Foreman laborer, at \$4 per diem	1,252.00	4.00	1,252.00
Messenger to commandant, at \$1.76 per diem	552.64	1.76	550.88
Messenger, at \$1.76 per diem	552.64	1.76	550.88
Mail messenger, at \$2 per diem*	732.00	2.00	730.00
Writer, at \$900 per annum	900.00	900.00	900.00
Draftsman, at \$4.56 per diem	1,390.80		
Rodman, at \$3.52 per diem	228.80		
Total	7,008.88		5,383.76
BROOKLYN, N. Y.			
Clerk, at \$1,400 per annum	1,319.44	1,400.00	1,400.00
Writer, at \$1,017.25 per annum	849.76	1,017.25	1,017.25
Two masters of tugs, at \$1,500 each per annum	2,910.13	1,500.00	3,000.00
Two writers, at \$900 each per annum	1,799.98	900.00	1,800.00
Foreman laborer, at \$4.50 per diem	1,415.25	4.50	1,408.50
Mail messenger, at \$2.50 per diem, increase of 50 cents per diem submitted*	724.00	2.50	912.50
Two messengers, at \$2.25, each, per diem	1,346.62	2.25	1,408.50
Draftsman, at \$5 per diem	1,542.50	5.00	1,565.00
Quartermen, at \$3 per diem	900.00	3.00	939.00
Superintendent of teams or quartermen, at \$4 per diem	1,224.00	4.00	1,252.00
Messenger to commandant, at \$2.25 per diem	814.75	2.25	821.25
Electrician, at \$1,200 per annum		1,200.00	1,200.00
Two engineers for cranes, at \$1,000 each per annum, submitted		1,000.00	2,000.00
Draftsman on works of improvement, at \$5 per diem	301.00		
Leveler on works of improvement, at \$4 per diem	1,200.00		
Quartermen wharf-builder on works of improvement, at \$4 per diem*	1,200.00		
Quartermen joiner on works of improvement, at \$4 per diem	1,196.00		
Rodman, at \$3 per diem	204.00		
Diver, at \$10 per diem	305.00		
Two electricians, at \$3.50 and \$3.28 per diem	1,638.44		
Total	20,910.87		18,724.00
SACKETTS HARBOR, N. Y.			
Ship keeper, at \$1 per diem	366.00	1.00	365.00
LEAGUE ISLAND, PA.			
Clerk, at \$1,400 per annum	1,400.00	1,400.00	1,400.00
Writer and telegraph operator, at \$1,000 per annum	1,000.00	1,000.00	1,000.00
Messenger, at \$2 per diem	628.00	2.00	628.00
Foreman laborer, at \$4 per diem	1,252.00	4.00	1,252.00

\* Sundays included.

## BUREAU OF YARDS AND DOCKS

No. 3.—Report showing amount expended during the fiscal year 1902.

Navy-yards and wharf, and use of pay.	Amount paid to employees during the fiscal year 1902.	Expenses for the fiscal year 1901.	Expenses for the fiscal year 1900.
<b>LEAHUE BEACH, FL.—Continued.</b>			
Draftsman, at \$5 per diem.....	\$ 100.00		
Assistant draftsman, at \$4 per diem.....	80.00		
Leveler, at \$5.54 per diem.....	110.84		
Subinspector, at \$3.56 per diem.....	71.20		
Do.....	100.00		
Rodman, at \$2.56 per diem.....	51.20		
Total.....	413.24		
<b>WASHINGTON, D. C.</b>			
Clerk, at \$1,400 per annum.....	1,400.00	1,400.00	1,400.00
Messenger, at \$2 per diem.....	100.00	100.00	100.00
Foreman laborer, at \$4 per diem.....	100.00	100.00	100.00
Electrician, at \$1.00 per annum.....	100.00	100.00	100.00
Draftsman, at \$5 per diem.....	100.00	100.00	100.00
Trackmaster, at \$1.50 and \$3.54 per diem.....	100.00	100.00	100.00
Inspector of dredging, at \$3 per diem.....	100.00	100.00	100.00
Total.....	1,900.00	1,900.00	1,900.00
<b>NORFOLK, VA.</b>			
Clerk, at \$1,400 per annum.....	\$ 1,400.00	1,400.00	1,400.00
Writer, at \$1,017.25 per annum.....	1,017.25	1,017.25	1,017.25
Writer, at \$1.00 per annum.....	100.00	100.00	100.00
Foreman laborer, at \$4 per diem.....	100.00	100.00	100.00
Mail messenger, at \$2 per diem.....	100.00	100.00	100.00
Two messengers, at \$2 each per diem.....	100.00	100.00	100.00
Pilot, at \$2.56 per diem.....	51.20	51.20	51.20
Electrician, at \$1.00 per annum.....	100.00	100.00	100.00
Draftsman, at \$5 per diem.....	100.00	100.00	100.00
Engineer for Crane, at \$1.00 per annum.....	100.00	100.00	100.00
Assistant draftsman, at \$3.56 per diem.....	71.20	71.20	71.20
Leveler, at \$4 per diem.....	80.00	80.00	80.00
Quartermaster, at \$1.50 per diem.....	30.00	30.00	30.00
Total.....	3,174.25	3,174.25	3,174.25
<b>PENSACOLA, FLA.</b>			
Clerk, at \$1,200 per annum.....	1,200.00	1,200.00	1,200.00
Mail messenger, at \$2 per diem.....	100.00	100.00	100.00
Total.....	1,300.00	1,300.00	1,300.00
<b>PEARL ISLAND, CAL.</b>			
Clerk, at \$1,400 per annum.....	1,400.00	1,400.00	1,400.00
Writer, at \$1,017.25 per annum.....	1,017.25	1,017.25	1,017.25
Foreman, mason, at \$6 per diem.....	1,200.00	1,200.00	1,200.00
Foreman laborer, at 5.50 per diem.....	1,100.00	1,100.00	1,100.00
Pilot, at \$4.80 per diem.....	1,500.00	1,500.00	1,500.00
Draftsman, at \$5 per diem.....	1,000.00	1,000.00	1,000.00
Mail messenger, at \$2 per diem.....	700.00	700.00	700.00
Messenger, at \$2 per diem.....	600.00	600.00	600.00
Messenger and lamplighter, at \$2 per diem.....	600.00	600.00	600.00
Electrician, at \$1,200 per annum.....	1,200.00	1,200.00	1,200.00
Trimmer for electric lamps, at \$2.24 per diem (submitted)*.....	12.24	12.24	12.24
Two firemen for electric plant, at \$3 per diem, each (submitted)*.....	3.00	3.00	3.00
Machinist in charge, at \$4.50 per diem (submitted).....	4.50	4.50	4.50
Quartermaster joiner, at \$4.48 per diem.....	1,400.00		
Rodman, at \$2.24 per diem.....	360.80		
Telegraph operator, at \$3.28 per diem.....	465.76		
Total.....	12,635.46		16,682.25
<b>KEY WEST, FLA.</b>			
Messenger, at \$600 per annum.....	600.00	600.00	600.00

\* Sundays included.

*Recapitulation of expenditures for certain employes for the fiscal year ending June 30, 1892, and estimates for the fiscal year ending June 30, 1894, per act approved January 30, 1885.*

Navy-yards and stations.	Expenditures, 1891-'92.	Estimates, 1893-'94.
Portsmouth, N. H. ....	\$7,478.40	\$7,298.50
Boston, Mass. ....	7,008.88	5,383.76
Sacketts Harbor, N. Y. ....	366.00	365.00
Brooklyn, N. Y. ....	20,910.87	18,724.00
League Island, Pa. ....	10,578.78	4,278.00
Washington, D. C. ....	5,502.38	4,278.00
Norfolk, Va. ....	10,154.23	11,123.63
Pensacola, Fla. ....	1,932.00	1,930.00
Key West, Fla. ....	600.00	600.00
Mare Island, Cal. ....	12,635.46	16,682.25
Total .....	77,167.00	70,658.14

*No. 9.—Statement of the appropriations for the Bureau of Yards and Docks for the fiscal year ending June 30, 1892, showing the amounts expended under each specific head of appropriation and the balances remaining unexpended June 30, 1892, as required by section 429, Revised Statutes.*

Appropriation for general maintenance, 1892.....	\$230,000.00
Expended from July 1, 1891, to June 30, 1892.....	209,233.70

Balance on hand July 1, 1892 .....	20,766.30
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Which will be entirely absorbed.

Appropriation for repairs and preservation, 1892 .....	300,000.00
Expended from July 1, 1891, to June 30, 1892 .....	277,943.54

Balance on hand July 1, 1892 .....	22,056.46
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Which will be entirely absorbed.

Appropriation, civil establishment, 1892 .....	59,197.37
Expended from July 1, 1891, to June 30, 1892 .....	58,365.12

Balance on hand July 1, 1892 .....	- 832.25
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Which will revert to the Treasury.

Appropriation for contingent, 1892 .....	20,000.00
Expended from July 1, 1891, to June 30, 1892 .....	19,700.27

Balance on hand July 1, 1892 .....	299.73
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Which will revert to the Treasury.

Appropriation for Naval Home, 1892 .....	71,215.00
Expended from July 1, 1891, to June 30, 1892 .....	55,607.96

Balance on hand July 1, 1892 .....	15,607.04
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After liabilities are paid balance will revert to Treasury.

Appropriation, navy-yard, Portsmouth, N. H.:

For increasing water supply .....	6,350.00
For completing hydrant system .....	6,080.00
For reconstructing buildings Nos. 45 and 46 .....	50,000.00
For constructing reservoir and perfecting water system .....	22,287.00

	84,717.00
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Expended from July 1, 1890, to June 30, 1892 .....	83,141.88
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Balance on hand July 1, 1892 .....	1,575.12
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Which will be entirely expended.

## BUREAU OF YARDS AND DOCKS.

115

navy-yard, Boston, Mass.:	
For new boiler and pumping machine, etc.....	\$50,000.00
For constructing steel shears.....	12,000.00
For extensions and renewals in water-pipe system, and repairs of wharves.....	5,000.00
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	67,000.00
Expended from July 1, 1890, to June 30, 1892.....	59,364.59
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Balance on hand July 1, 1892.....	7,635.41
which will be entirely absorbed.	
navy-yard, Brooklyn, N. Y.:	
For completing railroad system and necessary rolling stock.....	5,000.00
For constructing approaches to timber dry dock.....	25,000.00
For repairing cob dock, improvement of Whitney Basin, rebuilding sea wall and dredging.....	125,000.00
For relaying water pipes in the yard.....	15,000.00
For quay wall on cob dock.....	100,000.00
For paving and sewers around new dry dock.....	21,835.00
For one crane.....	5,000.00
	<hr/>
	296,835.00
Expended from July 1, 1890, to June 30, 1892.....	256,865.98
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Balance on hand July 1, 1892.....	39,969.02
which will be entirely expended.	
appropriation, navy-yard, League Island, Pa.:	
For timber dry dock.....	550,000.00
Expended from July 1, 1888, to June 30, 1892.....	550,000.00
	<hr/>
appropriation, navy-yard, League Island, Pa.:	
For rebuilding Broad Street wharf.....	86,416.40
For dredging and filling in.....	75,000.00
For building and furnishing officers' quarters.....	10,000.00
For dredging and filling in and paving and improvement of grounds.....	25,000.00
For extending permanent sea wall.....	25,000.00
For construction of light retaining wall.....	25,000.00
For west dry dock pier.....	87,441.62
For riprap for protection wall.....	9,150.00
For continuation of light retaining wall.....	25,000.00
For sewers and flushing taut.....	5,685.00
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	373,693.02
Expended from July 1, 1890, to June 30, 1892.....	239,589.61
	<hr/>
Balance on hand July 1, 1892.....	134,103.41
which will be entirely absorbed.	
appropriation, navy-yard, Washington, D. C.:	
For changing building No. 7 into an apartment house of three stories.....	10,000.00
For dredging and filling in.....	5,000.00
For extension of railroad tracks.....	3,567.50
For sanitary improvements for Smith quadrangle.....	5,000.00
For converting paint shop into two officers' quarters.....	8,220.59
For dredging and filling in.....	5,000.00
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	36,788.09
Expended from July 1, 1890, to June 30, 1892.....	27,726.77
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Balance on hand July 1, 1892.....	9,061.32
which will be expended.	
navy-yard, Norfolk, Va.:	
For building, by contract, two officers' quarters.....	16,000.00
Expended from July 1, 1889, to June 30, 1892.....	16,000.00
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## Appropriation, navy-yard, Norfolk, Va.:

Iron and steel shop .....	\$75,000
Railroad extension and system .....	15,000
Boiler-shop extension .....	14,448
Water system .....	20,000

124,448

Expended from July 1, 1890, to June 30, 1892 .....

117,

Balance on hand July 1, 1892 .....

7,257.

Which will be entirely expended.

## Appropriation, navy-yard, Norfolk, Va.:

For completing approaches to timber dry dock .....	10
For connecting new pumps with old dry dock .....	15,
For extending machine shop for steam engineering .....	9,100.

34

Expended from July 1, 1890, to June 30, 1892 .....

32

Balance on hand July 1, 1892 .....

1,312.

Which will be entirely expended.

## Appropriation, construction of dock, Port Royal, S. C.:

Toward the construction of a timber dry dock .....	350,000.
Expended July 1, 1890, to June 30, 1892 .....	160,193.

189,

Balance on hand July 1, 1892 .....

Which will be entirely expended.

## Appropriation, naval station, Key West, Fla.:

For changing location of railroad scale house and pump house .....	1,000.
Expended from July 1, 1890, to June 30, 1892 .....	1,000.

## Appropriation, navy-yard, Mare Island, Cal.:

For finishing boiler and machine shop .....	4,200.
For extending coal wharf .....	30,000.
For mud scow .....	4,500.

38,700.

Expended from July 1, 1888, to June 30, 1892 .....

38,419.

Balance on hand July 1, 1892 .....

280.24

Which will be entirely expended.

## Appropriation, navy-yard, Mare Island, Cal.:

For iron-plating shop .....	5,755.40
For roads along water front and about shops .....	5,000.00
For extension of quay wall .....	55,000.00

65,755.40

Expended from July 1, 1889, to June 30, 1892 .....

65,755.40

## Appropriation, navy-yard, Mare Island, Cal.:

For bridge across sectional basin .....	2,000.00
For boat landings .....	3,000.00
For building wagon road towards cemetery and magazine .....	5,000.00
For replanking wharves .....	5,000.00
For completing electric-light plant .....	30,000.00
For moving ferry slip back, straightening sea wall and dredging .....	20,000.00
For completing repairs to sectional dry dock .....	15,000.00
For widening gauge of railroad track .....	6,500.00
For roads .....	5,000.00
For extension of quay wall .....	25,000.00

riation, navy-yard, Mare Island, Cal.—Continued.

val and reconstruction of return wall sectional dry-dock	\$11,285.24
12-ton crane	4,000.00
	<hr/>
ed from July 1, 1890, to June 30, 1892	131,785.24
	84,844.10
	<hr/>
Balance on hand July 1, 1892	46,941.14
	<hr/>

ich will all be expended.

ropriation, adjustable stern dock for naval station, Key West, Fla.	30,000.00
unded from July 1, 1889, to June 30, 1892	27,000.00
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Balance on hand July 1, 1892	3,000.00
	<hr/>

ich is held to pay reservation under the contract.

ropriation, electric lighting of navy-yards	90,000.00
unded from July 1, 1889, to June 30, 1892	50,500.00
	<hr/>
Balance on hand July 1, 1892	39,500.00
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ich will be entirely expended.

Appropriation, launching ways and slips, New York and Norfolk navy-yards:

For extending launching ways and making alterations in ways and slips	20,000.00
Expended from July 1, 1890, to June 30, 1892	20,000.00
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Appropriation, increase of the navy, traveling cranes:

For two traveling cranes, of 40 tons capacity, dry docks at Norfolk and New York	30,000.00
Expended from March 2, 1891, to June 30, 1892	20,000.00
	<hr/>
Balance on hand July 1, 1892	10,000.00
	<hr/>

ch will be entirely expended.

ropriation, dry dock, Puget Sound, Washington:	
For purchase of tract of land for dry-dock site and construction of dry dock upon said land	20,000.00
Expended from July 1, 1891, to June 30, 1892	20,000.00
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Balance on hand July 1, 1892	0.00
	<hr/>

ch will be entirely expended.

ation, navy-yard, Norfolk, Va:	
extension of quay wall	5,000.00
Expended from July 1, 1891, to June 30, 1892	5,000.00
	<hr/>
Balance on hand July 1, 1892	0.00
	<hr/>

h will all be expended.



*Abstract and statement of offers received for contracts for improvements, materials, and services coming under the cognizance of the Bureau of Yards and Docks, as required, section 429, Revised Statutes, for fiscal year ending June 30, 1892.*

Offers for tin roofing at United States Naval Home building, under advertisement dated July 7, 1891:

John Boyd .....	\$2, 100.
Henry G. Robinson .....	2, 500.
E. S. Bortel & Co. ....	1, 955.
Gara, McGinley & Co.* .....	1, 549. 10

Offers for furnishing and driving yellow-pine piles for 40-ton traveling crane at the navy-yard, Norfolk, Va., under advertisement dated July 25, 1891:

H. E. Culpepper .....	\$5, 560. 00
Charles Blivin .....	6, 400. 00
Cofrode & Evans .....	5, 780. 00
Ross & Sanford* .....	4, 992. 00

Offers for repairs to wharf No. 3 at navy-yard, Boston, Mass., under advertisement dated August 1, 1891:

Horace Sias .....	\$3, 937. 00
J. N. Hayes & Co.* .....	3, 700. 00

Offers for constructing and erecting a pair of 100-ton shear legs at navy-yard, Boston, Mass., under advertisement dated July 24, 1891:

Walker Manufacturing Company .....	\$7, 333. 00
Phoenix Iron Company .....	6, 624. 72
Atlantic Works .....	6, 710. 00
Phoenix Bridge Company .....	5, 330. 00

No award made; readvertised:

Offers for installation of an incandescent electric-lighting plant, at the navy-yard, Norfolk, Va., under advertisement dated September 2, 1891:

Brush Electric Company .....	\$14, 500. 00
Western Electric Company .....	22, 547. 00
Thomson-Houston Electric Company .....	13, 750. 00
Edison General Electric Company* .....	12, 200. 00

Offers for constructing a system of dry-air closets with the buildings to contain the same at the United States navy-yard, Washington, D. C., under advertisement dated August 31, 1891:

Peter Hepburn* .....	\$1, 013. 50
Wm. Rothwell .....	4, 900. 00
A. W. Sweeney .....	4, 800. 00

Offers for constructing and erecting two girder bridges, one at the United States navy-yard, Brooklyn, N. Y., and one at the United States navy-yard, Norfolk, Va., under advertisement dated September 12, 1891:

Boston Bridge Works .....	\$1, 895. 00
S. C. Forsaith Machine Company* .....	1, 467. 00
Wrought Iron Bridge Company .....	1, 836. 00
Milliken Bros .....	1, 820. 00
John M. Field .....	1, 640. 00

Offers for constructing and erecting a pair of 100-ton shear legs at the United States navy-yard, Boston, Mass., under advertisement dated September 27, 1891:

S. C. Forsaith Machine Company .....	\$5, 163. 50
S. C. Forsaith Machine Company* .....	4, 990. 00
Walker Manufacturing Company .....	6, 500. 00
Phoenix Iron Company .....	5, 650. 61
Phoenix Bridge Company .....	5, 330. 00

Offers for pumping plant for caisson for granite dry dock at navy-yard, Brooklyn, N. Y., under advertisement dated December 22, 1891:

Southwark Foundry and Machine Company .....	\$2, 230. 00
Irvin Van Wie .....	1, 749. 00
S. C. Forsaith Machine Company .....	1, 664. 00
Donagan & Swift* .....	1, 194. 00
Robert J. Gray .....	1, 497. 00
Jos. Edwards & Co .....	1, 520. 00

\*Accepted.

Offers for double pipe wells to be driven at the navy-yard, Norfolk, Va., under advertisement dated December 18, 1881:

Wm. D. Andrews & Bro .....	\$1,799.00
Wm. D. Andrews & Bro. * .....	2,200.00
Abraham L. Spandown .....	4,230.00
Arthur J. Connelly .....	3,448.00
Wm. d. H. Washington .....	4,450.00

Offers for iron work required for alteration to building and construction of crane tower for installation of hydraulic reveter in boiler shop. wing of building No. 42, at United States navy-yard, Boston, Mass., under advertisement dated February 6, 1882:

S. C. Forsaith Machine Company .....	\$1,292.00
Wm. H. Wood .....	2,490.00
Phoenix Iron Company .....	1,117.48
Manhattan Supply Company * .....	1,019.50

Offers for the dredging at the United States navy-yard, Washington, D. C., under advertisement dated March 15, 1892:

Thomas P. Morgan .....	per cubic yard..	\$0.14 $\frac{2}{3}$
Frank C. Somer .....	do.....	.16 $\frac{1}{3}$

Offers for iron and steel work for erecting shed at United States navy-yard, Norfolk, Va., under advertisement dated March 21, 1892:

The King Bridge Company .....	\$1,164.00
Wm. B. Pollock & Co. * .....	1,050.00
The L. Shuber Sons Company .....	1,348.00
Greenlie, Wyatt & Co. ....	2,200.00
The Manhattan Supply Company .....	1,689.00
Thompson C. Gill & Co. ....	1,399.00
The Berlin Iron Bridge Company .....	1,600.00
The Pittsburg Bridge Company .....	1,287.00

Offers for dredging at the United States navy-yard, League Island, Pa., under advertisement dated May 2, 1892:

Frank C. Somers * .....	per cubic yard..	\$0.23 $\frac{1}{4}$
National Dredging Company .....	do.....	.26
American Dredging Company .....	do.....	.24 $\frac{3}{4}$
Atlas Dredging Company .....	do.....	.24 $\frac{5}{16}$
J. H. Fenner .....	do.....	.28

\* Accepted.

*Estimates of appropriations required for the service of the fiscal year ending June 30, 1894, by the Bureau of Yards and Docks, Navy Department.*

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1893.
<b>SALARIES.</b>			
One chief clerk (July 16, 1892) .....	\$1,800.00		
One draftsman and clerk (July 16, 1892) .....	1,800.00		
One clerk of class four (July 16, 1892) .....	1,800.00		
One clerk of class three (July 16, 1892) .....	1,600.00		
One clerk of class two (July 16, 1892) .....	1,400.00		
One clerk of class one (July 16, 1892) .....	1,200.00		
One copyist typewriter. Submitted .....	900.00		
One assistant messenger (July 16, 1892) .....	720.00		
One laborer (July 16, 1892) .....	660.00		
		\$11,880.00	\$10,960.00
<b>MAINTENANCE YARDS AND DOCKS.</b>			
For general maintenance of yards and docks, namely; for freight, transportation of materials and stores; books, map, models, and drawings; purchase and repair of fire engines; machinery; repairs on steam fire engines and attendance on the same; purchase and maintenance of oxen, horses, and driving teams; carts, timber wheels, and all vehicles for use in the navy-yards, tools, and repairs of the same; postage on letters and other mailable matter in public service sent to foreign countries, and telegrams; stationery, furniture for Government houses and offices, and heating and lighting the same in the navy-yards; coal and other fuel; candles, oil, gas, and electric lighting; cleaning and clearing up yards and care of buildings; attendance on fires, lights, fire engines, and apparatus; for incidental labor at navy-yards; water tax; tolls, and ferrage; rent of four officers' quarters at Philadelphia, Pa., pay of watchmen in navy-yards; awnings, and packing boxes, and advertising for yards and docks, and other purposes (act July 19, 1892) .....	450,000.00	450,000.00	230,000.00
<b>CONTINGENT YARDS AND DOCKS.</b>			
For contingent expenses to meet emergencies that may arise at navy-yards and stations (act July 19, 1892) .....	20,000.00	20,000.00	15,000.00
<b>REPAIRS AND PRESERVATION.</b>			
For navy-yards and stations (Act July 19, 1892) .....	450,000.00	450,000.00	275,000.00
<b>NAVAL HOME, PHILADELPHIA, PA.</b>			
One superintendent, per annum (act July 19, 1892) .....	600.00		
One steward, increase of \$120 submitted, per annum (same act) .....	600.00		
One matron, increase of \$120 submitted, per annum (same act) .....	480.00		
One chief cook, per annum (same act) .....	360.00		
One assistant cook, per annum (same act) .....	240.00		
One assistant cook, per annum (same act) .....	180.00		
One chief laundress, per annum (same act) .....	192.00		
Four laundresses, each \$168, per annum (same act) .....	672.00		
Four scrubbers, each \$168, per annum (same act) .....	672.00		
Eight waiters, each \$168, per annum (same act) .....	1,344.00		
Eight laborers, each \$240, per annum (same act) .....	1,920.00		
One master-at-arms, increase of \$120 submitted, per annum (same act) .....	600.00		
Two house corporals, increase of \$60 each, submitted per annum (same act) .....	720.00		
One engineer to run elevator, per annum (same act) .....	600.00		
One stablekeeper and driver, per annum (same act) .....	360.00		
One barber, per annum (same act) .....	360.00		
One painter, per annum (same act) .....	600.00		
One carpenter, per annum (same act) .....	845.00		
Water rent and gas (same act) .....	2,400.00		
Repairs to buildings, furnaces, grates, ranges, furniture, and repairs of furniture (same act) .....	5,000.00		
Cemetery, burial expenses, and headstones (same act) .....	350.00		
Improvement of grounds (same act) .....	500.00		
Music in chapel (same act) .....	600.00		
Transportation of indigent and destitute beneficiaries to the Home (same act) .....	500.00		
Support of beneficiaries (same act) .....	57,100.00		
		77,795.00	70,215.00
To reset and repave footway in front of wharf. Submitted .....	1,000.00	1,000.00	
		78,795.00	

*Estimates of appropriations required, etc.—Continued.*

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1893.
<b>NAVY-YARDS AND STATIONS.</b>			
<b>Navy-yard, Portsmouth, N. H.:</b>			
For boiler house No. 10, for steam engineering. Submitted (July 19, 1892).....	\$15,000.00	\$15,000.00	\$13,500.00
<b>Navy-yard, Boston, Mass.:</b>			
For improvement of ship houses. Submitted.....	10,000.00	55,000.00	
For installation of electric-light plant. Submitted....	15,000.00		
For repair of wharf. Submitted.....	30,000.00		
<b>Navy-yard, Brooklyn, N. Y.:</b>			
For completing gateway on Sand street and paving and grading streets in connection with same. Submitted.....	30,000.00	105,000.00	35,000.00
For extension of railroad tracks. Submitted.....	10,000.00		
For continuation of quay wall, Whitney Basin and cob dock. Submitted (July 19, 1892).....	125,000.00		
<b>Navy-yard, League Island, Pa.:</b>			
For construction of east dry-dock pier. Submitted...	82,387.00	154,987.00	43,000.00
For continuation of sea wall. Submitted.....	39,600.00		
For two new office quarters. Submitted.....	15,000.00		
For one pair shear legs. Submitted (July 19, 1892)....	18,000.00		
<b>Navy-yard, Washington, D. C.:</b>			
For new timber shed for ordnance purposes. Submitted.....	7,500.00	30,500.00	15,000.00
For conversion of mold loft building into a forge shop. Submitted.....	8,000.00		
For reconstruction of forge shop with foundation for crane column. Submitted.....	10,000.00		
For one wrecking car, with 15-ton crane attachments. Submitted.....	2,500.00		
For installation of electric lights in breech mechanism shop. Submitted (July 19, 1892).....	2,500.00		
<b>Navy-yard, Norfolk, Va.:</b>			
For extension of quay wall. Submitted.....	50,000.00	58,000.00	31,500.00
For extension of water system. Submitted (July 19, 1892).....	8,000.00		
<b>Navy-yard, Mare Island, Cal.:</b>			
For dredging. Submitted.....	26,282.00	134,340.00	18,800.00
For artesian well. Submitted.....	30,000.00		
For extending quay wall. Submitted.....	55,500.00		
For dry air closet. Submitted.....	4,456.00		
For new carriage house and dirt stables for yards and dock stables. Submitted.....	3,954.00		
For changes in steam engineering buildings. Submitted.....	4,797.00		
For shed for bending slabs, rolls, and furnaces. Submitted.....	6,381.00		
For engine-house for engine for C. and R. Submitted (July 19, 1892).....	3,470.00		
<b>Yard of the Navy, traveling cranes, Mare Island yard (July 19, 1892).....</b>			60,000.00
<b>Station, Port Royal, S. C.:</b>			
For storage. Submitted.....	846.00	10,243.00	156,500.00
For engine quarters. Submitted.....	7,336.00		
For engine-house. Submitted.....	1,079.00		
For barn. Submitted (July 19, 1892).....	982.00		
<b>Station, Puget Sound, Wash.:</b>			
For building. Submitted.....	3,000.00	32,000.00	
For engine-house. Submitted.....	10,000.00		
For grading and grading. Submitted.....	5,000.00		
For engine quarters for officers. Submitted.....	10,000.00		
For part of station. Submitted.....	2,000.00		
For artesian well. Submitted.....	2,000.00		

*Estimates of appropriations required, etc.—Continued.*

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1893.
<b>CIVIL ESTABLISHMENT YARDS AND DOCKS, 1894.</b>			
<b>Navy-yard, Portsmouth, N. H.:</b>			
One clerk, at \$1,400 per annum (July 19, 1892) .....	\$1,400.00		
One mail messenger, at \$2 per diem (July 19, 1892) * ..	730.00		
One messenger, at \$600 per annum (July 19, 1892) .....	600.00		
One foreman, laborer, and head teamster at \$4 per diem (July 19, 1892) * .....	1,460.00		
One janitor, at \$600 per annum (July 19, 1892) .....	600.00		
One pilot, at \$3 per diem (July 19, 1892) * .....	1,095.00		
One foreman mason, when required, \$4.50 per diem (July 19, 1892) .....	1,408.50		
		\$7,293.50	\$7,298.00
<b>Navy-yard, Boston, Mass.:</b>			
One clerk, at \$1,400 per annum (July 19, 1892) .....	1,400.00		
One foreman laborer, at \$4 per diem (July 19, 1892) .....	1,252.00		
One messenger to commandant, at \$1.76 per diem (July 19, 1892) .....	550.88		
One mail messenger, at \$1.76 per diem (July 19, 1892) ..	550.88		
One mail messenger, at \$2 per diem (July 19, 1892) * ..	730.00		
One writer, at \$900 per annum (July 19, 1892) .....	900.00		
		5,383.75	5,383.76
<b>Naval station, Sacketts Harbor, N. Y.:</b>			
One shipkeeper, at \$1 per diem (July 19, 1892) * .....	365.00	365.00	365.00
<b>Navy-yard, Brooklyn, N. Y.:</b>			
One clerk, at \$1,400 per annum (July 19, 1892) .....	1,400.00		
One writer, at \$1,017.25 per annum (July 19, 1892) .....	1,017.25		
Two masters of tugs, at \$1,500 each per annum (July 19, 1892) .....	3,000.00		
Two writers, at \$900 each per annum (July 19, 1892) ..	1,800.00		
One foreman laborer, at \$4.50 per diem (July 19, 1892) ..	1,408.50		
One mail messenger, at \$2.50 per diem, increase of 50 cents per day. Submitted (July 19, 1892) .....	912.50		
Two messengers, at \$2.25 per diem each (July 19, 1892) ..	1,408.50		
One draftsman, at \$5 per diem (July 19, 1892) .....	1,565.00		
One quartermaster, at \$3 per diem (July 19, 1892) .....	939.00		
One superintendent of teams or quartermaster, at \$4 per diem (July 19, 1892) .....	1,252.00		
One messenger to commandant, at \$2.25 per diem (July 19, 1892) * .....	821.25		
One electrician, at \$1,200 per annum (July 19, 1892) ..	1,200.00		
Two engineers for cranes, at \$1,000 each per annum. Submitted .....	2,000.00		
		18,724.00	16,541.50
<b>Navy-yard, League Island, Pa.:</b>			
One clerk, at \$1,400 per annum (July 19, 1892) .....	1,400.00		
One writer and telegraph operator, at \$1,000 per annum (July 19, 1892) .....	1,000.00		
One messenger, at \$2 per diem (July 19, 1892) .....	1,626.00		
One foreman laborer, at \$4 per diem (July 19, 1892) .....	1,252.00		
		4,278.00	4,278.00
<b>Navy-yard, Washington, D. C.:</b>			
One clerk, at \$1,400 per annum (July 19, 1892) .....	1,400.00		
One messenger, at \$2 per diem (July 19, 1892) .....	626.00		
One foreman laborer, at \$4 per diem (July 19, 1892) .....	1,252.00		
One electrician, at \$1,000 per annum (July 19, 1892) ..	1,000.00		
		4,278.00	4,278.00
<b>Navy-yard, Norfolk, Va.:</b>			
One clerk, at \$1,400 per annum (July 19, 1892) .....	1,400.00		
One writer, at \$1,017.25 per annum (July 19, 1892) .....	1,017.25		
One writer, at \$1,000 per annum (July 19, 1892) .....	1,000.00		
One foreman laborer, at \$4 per diem (July 19, 1892) .....	1,252.00		
One electrician, at \$1,200 per annum (July 19, 1892) ..	1,200.00		
One mail messenger, at \$2 per diem * (July 19, 1892) ..	730.00		
Two messengers, at \$2 each per diem (July 19, 1892) ..	1,252.00		
One pilot, at \$2.26 per diem (July 19, 1892) .....	707.88		
One draftsman, at \$5 per diem. Submitted (July 19, 1892) .....	1,565.00		
One engineer for crane, at \$1,000 per annum. Submitted .....	1,000.00		
		11,123.63	8,558.63
<b>Navy-yard, Pensacola, Fla.:</b>			
One clerk, at \$1,200 per annum (July 19, 1892) .....	1,200.00		
One mail messenger, at \$2 per diem * (July 19, 1892) ..	730.00		
		1,930.00	1,930.00

\* Including Sundays.

*Estimates of appropriations required, etc.—Continued.*

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1893.
<b>CIVIL ESTABLISHMENT YARDS AND DOCKS, 1894—continued.</b>			
<b>Naval station, Key West, Fla.:</b>			
One messenger, at \$600 per annum (July 19, 1892) .....	\$600.00	\$600.00	\$600.00
<b>Navy-yard, Mare Island Cal:</b>			
One clerk, at \$1,400 per annum (July 19, 1892) .....	1,400.00		
One writer, at \$1,017.25 per annum (July 19, 1892) .....	1,017.25		
One foreman mason, at \$6 per diem (July 19, 1892) .....	1,878.00		
One foreman laborer, at \$5.55 per diem (July 19, 1892) ..	1,721.50		
One pilot, at \$4.80 per diem (July 19, 1892) .....	1,502.40		
One draftsman, at \$5 per diem (July 19, 1892) .....	1,565.00		
One mail messenger, at \$2 per diem* (July 19, 1892) ..	730.00		
One messenger, at \$2 per diem (July 19, 1892) .....	626.00		
One messenger and lamplighter, at \$2 per diem (July 19, 1892) ..	626.00		
One electrician, at \$1,200 per annum (July 19, 1892) ..	1,200.00		
One trimmer of electric lamps, at \$2.24 per diem.*			
Submitted .....	817.60		
Two firemen for electric plant, at \$3 each per diem.*			
submitted .....	2,190.00		
One machinist in charge, at \$4.50 per diem. Sub-			
mitted .....	1,408.50	16,682.25	12,266.15
		70,658.14	61,499.04
			†\$61,380.69

\*Including Sundays.

†Amount appropriated joint resolutions June 30, and July 16, 1892, and naval act July 19, 1892.



REPORT  
OF  
THE CHIEF OF THE BUREAU OF EQUIPMENT.

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NAVY DEPARTMENT, BUREAU OF EQUIPMENT,  
*Washington, October 15, 1892.*

SIR: I have the honor to submit the following report of the operations of this Bureau, and its subordinate offices, for the fiscal year ending June 30, 1892, together with estimates for the support of the Bureau during the fiscal year to end June 30, 1894; the annual reports of the superintendent of the Naval Observatory and of the superintendent of the Nautical Almanac, the latter two reports accompanied by estimates respectively for the support of the Naval Observatory and the Nautical Almanac office for the fiscal year to end June 30, 1894; and the reports of the naval inspector of electric lighting and the superintendent of compasses.

There was expended abroad for the maintenance of cruising vessels from the appropriation Equipment of vessels, the sum of \$405,675.97, including \$298,948.55 for 35,017 $\frac{725}{3240}$  tons of coal.

There were also purchased at home 38,450 $\frac{882}{3240}$  tons of coal, costing \$221,918.66, making the total amount of coal purchased at home and abroad during the year, 73,467 $\frac{1887}{3240}$  tons, costing \$550,451.35.

The sum of \$540,604.52 was expended for material and labor during the fiscal year in equipping the various ships of the Navy.

Hemp for the manufacture of cables, towlines, and rope to the amount of 152 $\frac{234}{3240}$  tons was purchased at an expenditure of \$26,526.31.

The ropewalk and the equipment shops at the Boston navy-yard have to a large extent supplied rope, chain, cables, anchors, galleys, etc., to meet the wants of the service and the sail lofts at that station, and the New York, Norfolk, and Mare Island navy-yards have been occupied the greater part of the time with sail and other canvas work to supply new ships and to replace articles worn out in service.

Very respectfully,

GEORGE DEWEY,  
*Chief of Bureau.*

The SECRETARY OF THE NAVY,  
*Navy Department.*



*Estimates of appropriations required for the service of the fiscal year ending June 30, 1894, by the Bureau of Equipment, Navy Department.*

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1893.
<b>EQUIPMENT OF VESSELS.</b>			
For purchase of coal for steamers and ships' use, including expenses of transportation, storage, and handling the same; hemp, wire, iron, and other materials for the manufacture of cordage, anchors, cables, galleys, and chains; canvas for the manufacture of sails, awnings, hammocks, and other canvas work; water for steam launches and for steaming purposes; stationery for commanding and navigating officers of ships, equipment, officers on shore and afloat, and for the use of courts-martial on board ship, and for the purchase of all other articles of equipment at home and abroad, and for the payment of labor in equipping vessels and manufacture of equipment articles in the several navy-yards; foreign and local pilotage and towage of ships of war; services and materials in repairing, correcting, adjusting, and testing compasses on shore and on board ship; nautical and astronomical instruments and repairs to same; libraries for ships of war; professional books and papers and drawings and engravings for signal books; naval signals and apparatus, namely, signals, lights, lanterns, rockets, running lights; compass fittings, including binnacles, tripods, and other appendages of ship's compasses, logs, and other appliances for measuring the ship's way, and leads and other appliances for sounding; lanterns and lamps and their appendages for general use on board ship for illuminating purposes, and oil and candles used in connection therewith; bunting and other materials for making and repairing flags of all kinds; photographic instruments and materials; musical instruments and music; and installing and maintaining electric lights and interior signal communications on board vessels of war. (Appropriated July 19, 1892, pamphlet edition, pp. 4 and 5) .....		\$1,000,000.00	\$925,000.00
<b>CONTINGENT.</b>			
For freight and transportation of equipment stores, packing boxes and materials, printing, advertising, telegraphing, books, and models; furniture for equipment offices in the navy-yards; postage on letters sent abroad, ferriage, ice, lighterage of ashes, and emergencies arising under cognizance of the Bureau of Equipment unforeseen and impossible to classify. Appropriated July 19, 1892. (Pamphlet edition, p. 5) .....		12,000.00	12,000.00
<b>INCREASE OF THE NAVY.</b>			
Toward the completion of the equipment outfit of the new vessels heretofore authorized by Congress. Appropriated July 19, 1892. (Pamphlet edition, p. 18) .....	\$539,625.00		
Toward equipment outfit of one armored cruiser. Submitted .....	15,680.00	555,305.00	400,000.00
<b>CIVIL ESTABLISHMENT.</b>			
Navy-yard, Portsmouth, N. H.:			
One clerk (appropriated July 19, 1892, pamphlet, edition p. 5) .....	1,200.00		
One clerk, same act .....	1,000.00		
Navy-yard, Boston, Mass.:			
One superintendent of ropewalk, same act .....	1,875.00		
One clerk, same act .....	1,400.00		
Do .....	1,300.00		
One writer, same act .....	950.00		
Navy-yard, New York:			
One clerk, same act .....	1,400.00		
Do .....	1,200.00		
One writer, same act .....	1,000.00		
One storekeeper, same act .....	900.00		
Navy-yard, League Island, Pa.:			
One clerk, same act .....	1,200.00		
Navy-yard, Washington:			
One clerk, same act .....	1,000.00		

*Estimates of appropriations required for the service of the fiscal year ending June 30, 1894, by the Bureau of Equipment, Navy Department—Continued.*

Detailed object of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1893.
<b>CIVIL ESTABLISHMENT—continued.</b>			
Navy-yard, Norfolk, Va.:			
Two clerks, at \$1,200 each, same act .....	\$2,400.00		
Navy-yard, Mare Island, Cal.:			
One clerk, same act .....	1,200.00		
Do .....	1,000.00	\$19,025.00	\$19,025.00
<b>SALARIES.</b>			
One chief clerk (appropriated, July 16, 1892, R. S. p. 70, sec. 416, pamphlet edition, p. 31) .....	1,800.00		
One clerk of class two, same act .....	1,400.00		
One clerk of class one, same act .....	1,200.00		
Two copyists, at \$900 each, same act .....	1,800.00		
One assistant messenger, same act .....	720.00		
One laborer, same act .....	600.00	7,580.00	7,580.00

*Schedule of bids for wiring materials, fixtures, etc., electric, at navy-yards, New York and Norfolk, under advertisement dated July 1, 1891.*

<b>Class A:</b>		
Western Electric Company .....		\$6,027.07
The Safety Insulated Wire and Cable Company .....		6,836.80
The India Rubber and Gutta Percha Manufacturing Company .....		8,284.25
<b>Class B:</b>		
Edison General Electric Company .....		13,567.14
Arnold Electric Manufacturing Company* .....		10,285.95
Thomson-Houston Electric Company .....		15,273.00
<b>Class C:</b>		
Edison General Electric Company .....		940.75
Arnold Electric Manufacturing Company* .....		501.00
Thomson-Houston Electric Company .....		1,181.25
<b>Class D:</b>		
Edison General Electric Company .....		10,397.01
Joseph Barre .....		11,829.10
Thackera Manufacturing Company .....		10,415.50
Page Bros. & Co* .....		9,021.59
<b>Class E:</b>		
Edison General Electric Company .....		789.70
Arnold Electric Manufacturing Company .....		541.98*
R. A. Robbins* .....		501.45
George L. Neville .....		510.00
<b>Class F:</b>		
Edison General Manufacturing Company .....		1,678.84
Arnold Electric Manufacturing Company* .....		804.00
The O. & C. Electric Motor Company .....		1,754.40
<b>Class G:</b>		
R. A. Robbins* .....		451.00
George L. Neville .....		458.00
B (switch boards complete):		
Edison General Electric Company* .....		2,863.85
Thomson-Houston Electric Company .....		3,049.50

*Is of bids for constructing library fixtures, elevators, conduits, etc., at the new Naval Observatory. Bids opened July 31, 1891.*

<b>Library fittings, etc.:</b>		
or Brothers* .....		\$8,217.72
<b>Conduits:</b>		
H. McLaughlin .....		2,885.00

\* Awarded.

## Class 3. Passenger elevator:

L. S. Graves & Son (informal) .....	\$2, 750.00
Crane Elevator Company .....	4, 350.00
Otis Brothers* .....	3, 570.00
Whittier Machine Company .....	4, 950.00

## Class 4. Freight elevator (no award made):

L. S. Graves & Son .....	2, 075.00
Crane Elevator Company .....	2, 650.00
Otis Brothers .....	1, 910.00
Whittier Machine Company .....	1, 560.00

*Schedule of bids for construction at the new Naval Observatory. Bids opened August 8, 1891.*

## Superintendent's residence:

Richardson & Burgess .....	\$27, 537.00
Daniel A. Driscoll .....	26, 659.00
Columbus Thomas .....	26, 975.00
Samuel M. Plumley .....	28, 960.00

## Dynamo house:

R. H. McLaughlin & Co. ....	9, 285.79
Columbus Thomas .....	9, 272.00
Samuel M. Plumley .....	7, 270.00

## Standpipe, well, etc.:

R. H. Hammond & Co. ....	13, 761.72
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## Stand pipe only:

Chas. E. Burgess .....	1, 900.00
The Porter Manufacturing Company (Limited) .....	4, 300.00
A. G. Adelsburger .....	5, 880.00

## Fire place, etc.:

John H. Corning .....	1, 077.72
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## Pump house:

A. G. Adelsberger .....	799.00
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## Supply well:

A. G. Adelsberger .....	5, 268.00
Columbus Thomas .....	5, 000.00

## Fire hydrants:

E. L. Dent .....	each.. 80.00
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## Item No. 7.

W. T. Hamson .....	8, 008.22
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## Item No. 9:

Barber & Ross .....	1, 066.99
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## Fastenings, etc.:

H. Cransford .....	per cubic yard.. 7.00
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## Cement basement:

H. Cransford .....	per square foot.. 27.00
--------------------	-------------------------

## Neuchatel on roof:

H. Cransford .....	do.. .50
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## Artificial floors:

H. Cransford .....	do.. .18
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## Artificial floors for area:

H. Cransford .....	do.. .25
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No awards made.

*Schedule of bids for equipment supplies exempted articles for navy-yard, New York. Bids opened August 10, 1891.*

## Class A:

Edison General Electric Company* .....	\$774.98
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## Class B:

Edison General Electric Company* .....	475.97
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## Class C:

No bid.

## Class D:

Tissot & Schultz* .....	193.07
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## Class E:

No bid.

## Class F:

Tissot & Schultz* .....	421.96
-------------------------	--------

## Class G:

No bid.

## Class H:

No bid.

\* Awarded.

*Schedule of bids for construction, etc., at the new Naval Observatory. Bids opened September 19, 1891.*

<b>Residence of Superintendent:</b>	
Peter Fesinger .....	\$25,338.00
Jas. E. Walter .....	22,500.00
Wm. Rothwell .....	28,228.00
S. M. Plumley .....	24,970.00
W. T. Garrison .....	22,117.00
Andrew Rankin* .....	18,770.00
Halliday & Richardson .....	21,100.00
Columbus Thomas .....	22,927.00
<b>Mantels, etc.:</b>	
Barber & Ross (no award) .....	660.00
<b>Fire hydrants:</b>	
E. L. Dent, each* .....	89.50
<b>Stand pipe:</b>	
Boiler Manufacturing Company .....	4,300.00
John Baizley .....	3,820.00
Porter Boiler Manufacturing Company .....	4,650.00
Connery Boiler Company* .....	2,890.00
D. G. Adelsberger .....	4,250.00
E. L. Dent .....	4,730.50
R. H. Hammond & Co .....	4,600.00
<b>Excavations for well, caissons, etc.:</b>	
D. G. Adelsberger (for 120 feet, with right reserved by Bureau to take more or less)* .....	6,046.00
<b>Foundation for stand pipe:</b>	
Connery Boiler Company* .....	1,000.00
D. G. Adelsberger .....	1,295.00
<b>Boiler house (no award):</b>	
Timothy O'Conner .....	8,475.00
William Rothwell .....	8,856.00
S. M. Plumley .....	8,270.00
W. T. Garrison .....	7,545.00
Columbus Thomas .....	7,810.00
<b>Pump house:</b>	
D. G. Adelsberger .....	799.00
S. M. Plumley* .....	670.00
<b>Well pump:</b>	
D. G. Adelsberger* .....	1,250.00
<b>Pig lead, etc.:</b>	
Thos. Sommerville & Sons* .....	827.04

*Schedules for materials for new Naval Observatory. Bids opened December 12, 1891.*

<b>Gates:</b>	
Champion Iron Company .....	\$1,040.00
Pettit & Dripps .....	1,040.00
E. L. Dent Iron Works (informal) .....	{ 1,030.00
C. A. Schneider's Sons .....	{ 1,000.00
A. L. Smith & Co .....	1,040.00
<b>Letter A, class 14:</b>	
J. H. Chesley & Co .....	43.40
W. E. Clark & Co .....	45.30
C. H. Pleasants .....	43.10
W. A. Pate* .....	40.72
<b>Letter A, class 19:</b>	
Thos. W. Smith* .....	1,445.60
<b>Letter A, class 31:</b>	
H. Chesley & Co .....	25.51
E. Clark & Co. (informal) .....	20.20
A. Pate* .....	25.25
<b>Letter A, class 7:</b>	
H. Chesley & Co. (informal) .....	33.75
<b>Letter H, class 20 (no award):</b>	
H. Mohler* .....	64.10
<b>Letter H, class 20 (no award):</b>	
& Dripps .....	241.00
Clark & Co .....	55.00

\* Awarded.

Letter B, Class 31:	
W. A. Pate*	\$32.70
Letter C, class A:	
Edison General Electric Company (informal)	1,484.98
Tissot & Schultz	2,069.00
New York Insulated Wire Company*	1,702.10
Vallee Brothers (informal)	1,462.75
Royce & Marean	2,069.66
Letter C, class B:	
Edison General Electric Company*	392.06
Tissot & Schultz	457.54
Vallee Bros. (informal)	363.54
Class C:	
Edison General Electric Company*	43.00
Tissot & Schultz	46.00
Vallee Bros. (informal)	42.80
Royce & Marean	46.75
Class D:	
Edison General Electric Company	229.02
Tissot & Schultz*	218.28
Royce & Marean (informal)	79.40
W. A. Pate	285.00
Class F:	
Edison General Electric Company	318.32
J. B. Hammond*	311.11
Vallee Bros.	816.50
Royce & Marean	408.19
Thos. W. Smith	419.62
Class G:	
Edison General Electric Company	275.28
American Circular Loom Company	243.60
New York Insulated Wire Company*	195.46
Vallee Bros.	296.52
Class H:	
Edison General Electric Company*	59.61
Tissot & Schultz	74.45
Vallee Bros. (informal)	53.86
Royce & Marean	62.35
Letter C, class 5:	
W. A. Pate*	2.25
Letter C, class 11:	
J. H. Chesley & Co.	2.85
C. H. Pleasants	1.50
W. A. Pate*	.75
Letter C, class 14:	
J. H. Chesley & Co.*	{ A.. 19.33
	{ B.. 33.51
C. H. Pleasants	33.89
W. A. Pate*	{ A.. 23.32
	{ B.. 30.66
Letter C, class 17:	
C. H. Pleasants*	9.50
Letter C, class 19:	
Thos. W. Smith*	3.12
Letter C, class 10:	
J. H. Chesley & Co.	3.84
W. A. Pate*	3.72
Aquila Rich Paint and Color Company	5.16
Letter C, class 21:	
C. H. Pleasants	12.08
W. A. Pate*	9.35
Letter C, class 24:	
C. H. Pleasants	24.14
W. A. Pate	23.00
Aquila Rich Paint and Color Company*	18.65
Letter C, class 25:	
W. A. Pate*	21.50

\* Awarded.

C. class 31:	
t & Schultz .....	\$75. 60
W. A. Pate* .....	57. 05
F. Hewitt, items 5 and 6* .....	726. 00
John B. Daish, item 5 .....	711. 20
W. H. Mohler, item 2 (informal) .....	652. 50
Class 7, item 7:	
John B. Lord* .....	290. 00
Class 7, item 9:	
Pettit & Dripps* .....	798. 61
E. L. Dent Iron Works .....	989. 20
A. L. Smith & Co .....	804. 34
Class 7, item 10:	
Thos. W. Smith* .....	381. 25
Class 6:	
W. A. Pate* .....	3. 24
Class 10:	
C. H. Pleasants* .....	5. 00
W. A. Pate .....	7. 50
Class 11:	
C. H. Pleasants* .....	810. 00
Class 14:	
W. A. Pate* .....	4. 25
Class 17 (no bids).	
Class 22:	
Aquila Rich Paint and Color Company* .....	4. 80
C. H. Pleasants .....	6. 60
Class 28:	
Aquila Rich Paint and Color Company* .....	17. 00
C. H. Pleasants .....	11. 00
Awarded—	
W. A. Pate .....	23. 40
t & Schultz (informal) .....	75. 60
Aquila Rich Paint and Color Company (informal) .....	90. 70
W. F. Hewitt (informal) .....	254. 50
C. H. Pleasants .....	321. 18
J. B. Daish* .....	234. 25
Class 24:	
Aquila Rich Paint Company* .....	. 35
C. H. Pleasants .....	. 35
E, Class 7, item 3:	
John B. Lord* .....	120. 00
E, Class 7, item 4:	
C. H. Pleasants .....	175. 50
J. B. Daish* .....	161. 20
E, Class 7, item 5:	
Pettit & Dripps* .....	23. 70
C, Class 24, item 15:	
C. H. Pleasants* .....	38. 14
Aquila Rich Paint and Color Company* .....	36. 47

*of bids for materials at the new Naval Observatory, opened February 27, 1893.*

Babcock and Wilcox Company .....	\$1, 885. 00
Porttown Steam Engine Company* .....	1, 050. 00
Engine Company .....	2, 751. 00
& Thomas .....	2, 332. 00
Fleming & Co.* .....	1, 950. 00
Lums & Hank .....	2, 208. 00
Humpson & Co .....	2, 150. 00
on-Houston Electric Company .....	2, 600. 00
ox .....	2, 230. 00
General Electric Company* .....	2, 039. 00
Dynamo Company .....	2, 990. 00

\* Awarded.

Furthermore, the large dome at the observatory is to be raised to the second floor to facilitate the use of spectroscopes and other instruments. By means of these additions and improvements, the observatory will gain in convenience of observation and in the amount of work accomplished.

#### THE TRANSIT CIRCLE.

(Prof. J. R. East, in charge.)

Since the annual report for 1891 the transit circle has been altered and extended, and installed in the new observing house, which unfortunately was not finished in time to make the proposed observations of Mars. The instrument will probably be ready for use in October, 1892. The present force for transit circle work consists only of the officer in charge and two computers. The reduction of the work for 1889 is ready for the printer, and the reductions for 1890 and 1891 are nearly completed. At present, a part of the force is engaged in making a card catalogue of the stars contained in the Washington zones.

#### THE SEXTANT AND CIRCULAR.

(Professor J. R. East, in charge.)

This instrument has been used for observing asteroids, occultations of stars by the moon, and other favorable opportunity. The observations have all been reduced, and the results have been published in the *Astrophysical Journal*. The observations in each week have been set apart for the next week's observations.

#### THE SEXTANT AND CIRCULAR.

(Professor J. R. East, in charge.)

- Class A: The sextant and circular, 1892. He was assisted by  
Class B: The sextant and circular, 1892. He was assisted by  
Class C: The sextant and circular, 1892. He was assisted by  
Class D: The sextant and circular, 1892. He was assisted by  
Class E: The sextant and circular, 1892. He was assisted by  
Class F: The sextant and circular, 1892. He was assisted by  
Class G: The sextant and circular, 1892. He was assisted by  
Class H: The sextant and circular, 1892. He was assisted by  
Class I: The sextant and circular, 1892. He was assisted by  
Class J: The sextant and circular, 1892. He was assisted by  
Class K: The sextant and circular, 1892. He was assisted by

## REPORT OF THE SUPERINTENDENT OF THE U. S. NAVAL OBSERVATORY.

## U. S. NAVAL OBSERVATORY.

*Washington, September 29, 1892.*

**SIR:** I have the honor to present the subjoined report, called for by the Bureau's order dated August 2, 1892 (No. 3243), of the operations of the Naval Observatory during the year ending June 30, 1892.

The personnel of the establishment on July 1, 1891, consisted of the following officers:

Capt. F. V. McNair, superintendent; Lieut. Commander Walton Goodwin; Ensigns Thomas Snowden, J. A. Hoogewerff, H. H. Whittlesey; Profs. Asaph Hall, Wm. Harkness, J. R. Eastman, Edgar Frisby, and S. J. Brown. Changes have occurred as follows—reported for duty: Passed Assistant Engineer A. V. Zane, on July 17, 1891; Commander Joshua Bishop, August 5, 1891; Ensign W. W. Gilmer, August 8, 1891. Detachments: Ensign H. H. Whittlesey, on August 12, 1891; Ensign W. W. Gilmer, August 19, 1891; Ensign Thomas Snowden, April 16, 1892; Ensign J. A. Hoogewerff, June 25, 1892.

## THE 26-INCH EQUATORIAL.

On October 15, 1891, Prof. Asaph Hall was retired for age, and the Observatory lost the services of one of the most illustrious astronomers of the present century. His discovery of the satellites of Mars brought renown not only to himself, but also to the naval service and to the country, and his magnificent series of measurements of double stars is comparable both in extent and accuracy with the best existing observations of the same character. Since October 15, 1891, the observer was Assistant Astronomer Asaph Hall, jr. Prof. Hall was engaged in completing his observations of double stars and in reducing and collecting them into a catalogue, which has been published by the Observatory as Appendix I to the volume for 1888. He also made observations for the flexure and position of the telescope and investigated anew the periodic errors of its micrometer screw.

Assistant Astronomer Hall was engaged in observing the satellite of Neptune, the satellites of Saturn, and the two outer satellites of Uranus. The reduction of all these observations is well advanced, and those of Neptune's satellite have been published in Gould's *Astronomical Journal*. They confirm the motion of the orbit plane of the satellite with respect to the orbit of Neptune which was suspected by Marth in 1886.

As Mars will be nearer the Earth during its opposition in August, 1892, than at any other time since the discovery of its satellites in 1877, it seemed fitting that Prof. Hall, the discoverer of these satellites, should have the privilege of observing them once more under such exceptionally favorable circumstances. Accordingly, the Superintendent has reserved him the use of the 26-inch telescope for that purpose, and it is expected that an excellent series of measures will be secured. This telescope will be dismantled immediately after the completion of the reductions of the Mars satellites in September, and meanwhile a new more modern mounting is being constructed for it by Messrs. & Swasey, of Cleveland, Ohio. The micrometer and circles illuminated by incandescent lights; a larger position circle is provided, and a more powerful driving clock is to take the place



of the present one. Furthermore, the large dome at the new site is to have an elevating floor to facilitate the use of spectroscopes and other heavy apparatus. By means of these additions and improvements, there will be a gain in convenience of observation and in the amount of work accomplished.

#### THE TRANSIT CIRCLE.

(Prof. J. R. Eastman in charge.)

Since the annual report for 1891 the transit circle has been altered and repaired, and installed in the new observing house, which unfortunately was not finished in time to make the proposed observations of Mars. The instrument will probably be ready for use in October, 1892. The present force for transit circle work consists only of the officer in charge and two computers. The reduction of the work for 1889 is ready for the printer, and the reductions for 1890 and 1891 are nearly completed. At present, a part of the force is engaged in making a card catalogue of the stars contained in the Washington zones.

#### THE 9.6-INCH EQUATORIAL.

(Professor Edgar Frisby in charge.)

This instrument has been used in observing asteroids, occultations of stars by the moon, and comets, at every favorable opportunity. The observations have all been reduced, and most of the results have been published in the astronomical journals. Two nights in each week have been set apart for the accommodation of visitors.

#### CHRONOMETERS.

(Assistant Astronomer A. N. Skinner in charge.)

Mr. Skinner assumed charge April 26, 1892. He was assisted by Computer F. E. Dennett.

During the year 44 chronometers have been issued and 40 turned in. Forty-two standard and 13 hack chronometers are ready for issue; 5 await trial. There are in use on naval vessels 119 standard and 36 hack chronometers; at Mare Island Navy-yard, 29 standard and 14 hack chronometers; at other shore stations, 13 standard and 19 hack chronometers; surveyed and condemned 14, in museum 17, and at the makers for repairs, 44 chronometers. Pocket chronometers ready for issue, 5; in use at shore stations, 1; comparing watches ready for issue, 17.

Twenty-nine chronometers received from makers, cleaned and repaired, were on trial from January 9 to July 11, 1892. The records of this trial are given in Appendix A.

#### TIME SERVICE.

Owing to the detachment from duty at the Observatory of the officers connected with the time service, it was, on August 1, placed in charge of Prof. S. J. Brown, and on September 1 Computer George A. Hill was detailed as his assistant. No other changes have been made in this service.

## MERIDIAN TRANSIT INSTRUMENT.

The transit instrument has been constantly in use for determination of clock corrections in connection with the time service. Ensign Thomas Snowden was in charge until August 1, 1891, when it was necessary to place this instrument and the time service in charge of Prof. S. J. Brown, owing to the detachment of the officers engaged in this and the chronometer work. Computer Hill was his assistant.

## MAGNETIC INSTRUMENTS.

The usual routine observations and reductions have been kept up during the year. The observations and reductions for 1891 were published as an appendix to the Washington Observations for 1888.

Ensign J. A. Hoogewerff was in charge until November 1, 1891, when, owing to notification by the Department that his services would be required elsewhere, he was relieved by Prof. S. J. Brown. The work was carried on conjointly by them until June 25, when Ensign Hoogewerff was detached.

## LIBRARY AND PUBLICATIONS.

The library, printing, and distribution of the Observatory publications have been under the general supervision of Assistant Astronomer H. M. Paul, with William D. Horgan assistant librarian.

During the fiscal year 1891-'92 bound volumes only have been entered in the accession book. These number 299 (125 by exchange and 174 by purchase), making the total number of bound volumes in the library about 13,500. The annual accessions of unbound books, periodicals, and pamphlets amount to about 400 volumes. One hundred and sixty volumes have been bound during the year, leaving upwards of 1,000 volumes still unbound owing to want of funds.

The following publications have been distributed to the regular exchange lists:

1. The Annual Report of the Superintendent for 1891.
2. The Washington Observations for the year 1887.
3. The Washington Observations for the year 1888.
4. 1887: Appendix 1—Marsh, C. C. Magnetic Observatories of Europe.
5. 1887: Appendix 2—Hoogewerff, J. A. Magnetic Observations, 1890.
6. 1887: Appendix 3—Eastman, J. R. Meteorological Observations, 1883-'87.
7. 1888: Appendix 1—Hall, Asaph. Double-star Observations. Part 2, 1880-'91.
8. 1888: Appendix 2—Hoogewerff, J. A. Magnetic Observations, 1891.
9. 1888: pp. D. 1-60—Meteorological Observations, 1888.

## TOTAL SOLAR ECLIPSE OF APRIL 15, 1893.

A total solar eclipse will occur on April 15, 1893, under circumstances so favorable that its observation is very desirable. The central line of the shadow sweeps across South America, the Atlantic Ocean, and the northwestern part of Africa. The duration of totality is 4 minutes and 42 seconds near Ceara, on the northern coast of Brazil, and 4 minutes and 10 seconds near Bathurst, Senegambia, in West Africa. It is important that this opportunity for studying the constitution of the sun should be utilized by sending two observing parties, one to Ceara, Brazil, and the other to Bathurst, West Africa.

It is recommended that expeditions be sent to those places composed entirely of officers and others under the control of the Navy Department. Independent of travel and transportation, the sum of \$5,000 will

be necessary for the purchase of instruments, outfit and contingent expenses. Such appropriation must be made available prior to January 15, 1893, to accomplish the desired observations.

#### NEW NAVAL OBSERVATORY.

On September 8, 1891, the contract for the construction of the new Naval Observatory was declared forfeited. On February 16, 1892, a contract was awarded for the completion of the new Naval Observatory; which contract has not been fulfilled.

The installation of boilers, engines, electric plant, stand-pipe and water-supply system will shortly be completed.

The grounds have been graded and roads constructed to the extent that the appropriation for that purpose admitted.

The Superintendent's residence is still in the hands of the contractor.

Very respectfully,

F. V. MCNAIR,

*Captain, U. S. Navy, Superintendent.*

The CHIEF OF THE BUREAU OF EQUIPMENT,  
Navy Department.

*Estimates of appropriations required for the service of the fiscal year ending June 30, 1894,  
by the United States Naval Observatory.*

Detailed objects of expenditure and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1893.
<b>SALARIES, NAVAL OBSERVATORY</b>			
One assistant astronomer (R. S., p. 27, sec. 167; Aug. 5, 1882, vol. 22, p. 245, sec. 1, July 16, 1892).	\$2,000.00		
Two assistant astronomers, at \$1,800 each (same acts).....	3,600.00		
One clerk of class four (same acts) .....	1,800.00		
One instrument-maker (same acts) .....	1,500.00		
One electrician (same acts) .....	1,500.00		
One photographer (same acts) .....	1,200.00		
Five computers, at \$1,200 each (same acts) .....	6,000.00		
One assistant librarian (same acts) .....	1,200.00		
One copyist (same acts) .....	900.00		
One carpenter (same acts) .....	1,000.00		
One engineer (same acts) .....	1,000.00		
Two assistant engineers, at \$900 each (submitted) .....	1,800.00		
Two skilled laborers, one at \$1,000 and one at \$720 (same acts).....	1,720.00		
Three firemen, at \$720 each (same acts; increase of one submitted).....	2,160.00		
Six watchmen, at \$720 each (same acts).....	4,320.00		
Two assistant messengers, at \$720 each (submitted) .....	1,440.00		
One elevator conductor (submitted).....	720.00		
Eleven laborers, at \$660 each (same acts).....	7,260.00		
Two charwomen, at \$240 each (submitted).....	480.00		
		41,600.00	36,440.00
<p>NOTE.—Assistant engineers and firemen. Work at the Naval Observatory is carried on at night in addition to the regular office hours. There are two boilers for heating purposes, and one boiler, two engines, and two dynamos, which, together with the extensive system of lighting, heating, and water works, require three engineers and three firemen for the 24 hours, each engineer and fireman being on duty eight hours.</p> <p><i>Assistant messengers.</i>—One assistant messenger to Superintendent and one for mail-carrier. All mail for the Observatory is delivered at the Navy Department, which is distant from the Observatory about 2½ miles via Tennallytown road.</p> <p><i>Elevator conductor.</i>—The number of visitors to the Naval Observatory at night is about 2,500 per annum, the majority of whom are women, and an expert elevator conductor is essential to prevent accident.</p>			



*Estimates of appropriations required for the service of the fiscal year ending June 30, 1894,  
by the United States Naval Observatory—Continued.*

Detailed object of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1893.
STATIONARY FIRE ENGINE.			
For 1 stationary fire engine, with pipes, connections and frame shelter. (Submitted.) .....	\$4,500.00		
NOTE.—The capacity of the present pumping-engines and stand pipe is not adequate for the extinction of any extensive fire. It is proposed, therefore, to utilize the pond in the Industrial Home grounds, adjoining the Observatory grounds, as a reserve.		\$4,500.00	

## Record of trial of repaired chronometers, January 9 to July 1, 1892.

[In temperature room from January 9 to March 12; after that in chronometer room.]

Relative number.	Repaired by—	Time, 1892.	Jan. 9 to Jan. 14.	Jan. 15 to Jan. 20.	Jan. 21 to Jan. 26.	Feb. 5 to Feb. 10.	Feb. 11 to Feb. 16.	Feb. 17 to Feb. 22.	Feb. 23 to Feb. 28.	Mar. 1 to Mar. 6.	Mar. 7 to Mar. 12.	Mar. 13 to Mar. 23.	Mar. 23 to Apr. 2.	Apr. 2 to Apr. 12.	Apr. 12 to Apr. 22.
		Temperature	44.67	55.12	70.13	84.80	90.10	85.23	80.80	54.74	45.35	56.81	62.52	69.51	63.25
		Relative humidity, per cent.	69.97	67.76	70.60	66.89	68.12	70.81	70.70	67.86	73.44				
1	Neg.	Chronometer-maker, John Hutton.	372	+1.508	+0.446	+0.036	+1.478	+1.058	+0.404	+0.686	+1.872	+0.572	+0.083	+0.218	+0.168
2	Neg.	T. S. & J. D. Negus	1598	+1.428	+0.486	+0.214	+1.378	+1.058	+0.404	+0.586	+1.772	+0.697	+0.604	+0.586	+0.482
3	Neg.	do	1024	+1.308	+0.196	+0.786	+1.010	+0.192	+0.346	+0.386	+1.572	+0.078	+0.707	+0.019	+0.808
4	Bl.	John Bliss & Co	2827	+0.558	+1.196	+0.558	+1.278	+1.508	+2.004	+1.536	+2.722	+0.647	+1.568	+1.506	+0.418
5	Neg.	T. S. & J. D. Negus	1195	+2.058	+0.686	+0.336	+0.328	+0.408	+0.054	+0.686	+2.022	+0.447	+0.007	+0.369	+0.118
6	Neg.	do	1317	+2.008	+1.196	+0.364	+1.278	+0.908	+0.154	+0.936	+2.072	+1.347	+0.688	+0.356	+0.252
7	Neg.	do	1300	+2.158	+0.796	+0.200	+1.078	+1.108	+0.454	+1.236	+2.072	+1.022	+0.268	+0.084	+0.218
8	Bl.	Wm. Bond & Son	529	+3.258	+2.396	+2.064	+3.078	+3.758	+2.754	+2.486	+3.872	+2.687	+2.543	+2.081	+2.557
9	Neg.	T. S. & J. D. Negus	1097	+0.698	+0.754	+1.986	+0.972	+0.892	+1.546	+0.914	+0.172	+1.078	+1.507	+1.969	+1.718
10	Neg.	T. S. & J. D. Negus, S. B. C.	1536	+0.616	+0.346	+0.581	+1.523	+1.064	+0.060	+0.291	+0.927	+0.276	+0.102	+0.001	+0.087
11	Neg.	do	1520	+0.564	+1.676	+0.591	+0.293	+0.186	+1.290	+1.159	+0.473	+1.074	+1.402	+1.390	+1.405
12	Neg.	T. S. & J. D. Negus	1244	+1.458	+0.296	+0.536	+1.278	+0.658	+0.204	+0.696	+1.472	+0.697	+0.118	+0.056	+0.132
13	Neg.	do	1298	+0.358	+0.804	+1.186	+0.378	+0.008	+0.306	+0.104	+1.122	+0.853	+1.557	+1.869	+1.768
14	Neg.	do	919	+0.192	+1.404	+2.536	+1.160	+1.592	+2.446	+1.814	+0.678	+1.478	+2.297	+2.519	+2.443
15	Neg.	do	1343	+0.842	+0.894	+2.386	+1.680	+0.792	+1.316	+1.214	+0.928	+1.133	+1.507	+1.644	+1.618
16	Neg.	do	1059	+0.158	+0.754	+0.636	+1.178	+0.858	+0.346	+0.404	+0.572	+0.528	+0.757	+0.769	+0.985
17	Neg.	T. S. & J. D. Negus, S. B. C.	1518	+0.336	+0.686	+0.689	+2.063	+1.934	+0.360	+0.241	+0.757	+0.674	+0.702	+0.415	+0.384
18	Neg.	T. S. & J. D. Negus	1521	+3.288	+1.496	+0.364	+1.028	+0.906	+0.704	+1.786	+3.372	+1.722	+0.965	+0.581	+0.782
19	Bl.	Wm. Bond & Son	505	+2.688	+1.046	+0.186	+0.878	+0.966	+0.804	+1.716	+3.822	+1.507	+0.793	+0.306	+0.622
20	Neg.	T. S. & J. D. Negus	1297	+0.808	+1.054	+1.956	+0.428	+0.042	+0.946	+0.764	+4.472	+0.578	+1.362	+1.844	+1.745
21	Neg.	T. S. & J. D. Negus, S. B. C.	1537	+4.946	+4.374	+3.369	+4.453	+2.864	+3.410	+4.391	+4.477	+3.651	+3.423	+3.469	+3.488
22	Neg.	T. S. & J. D. Negus	1328	+2.508	+1.106	+0.204	+2.078	+1.708	+0.154	+1.386	+2.722	+1.067	+0.643	+0.481	+0.257
23	Bl.	Wm. Bond & Son	272	+1.592	+0.954	+0.314	+2.578	+1.958	+0.704	+0.684	+0.878	+0.828	+0.382	+0.506	+0.343
24	Neg.	T. S. & J. D. Negus	1308	+1.758	+0.946	+0.164	+1.028	+1.508	+1.004	+1.686	+2.972	+0.972	+0.443	+0.456	+0.332
25	Neg.	T. S. & J. D. Negus, S. B. C.	1510	+1.016	+0.646	+0.181	+1.583	+1.704	+0.410	+0.058	+1.227	+0.291	+0.227	+0.100	+0.087
26	Neg.	T. S. & J. D. Negus	1268	+1.908	+0.146	+1.486	+0.478	+0.638	+0.054	+1.036	+2.172	+0.447	+0.382	+0.794	+0.543
27	Neg.	T. S. & J. D. Negus, S. B. C.	1527	+1.016	+0.574	+1.869	+4.483	+4.064	+2.250	+1.241	+2.507	+2.101	+2.086	+2.185	+1.664
28	Neg.	T. S. & J. D. Negus	1126	+1.098	+0.004	+0.314	+1.128	+1.008	+0.554	+1.036	+3.622	+1.807	+0.293	+0.306	+0.207
29	Neg.	T. S. & J. D. Negus, M. T. B. C.	1255	+0.142	+1.504	+0.536	+2.028	+1.508	+0.154	+0.480	+1.872	+0.447	+0.052	+0.206	+0.368

NOTE.—The sign + signifies a gaining rate; — signifies a losing rate; S. B. C. signifies sidereal break circuit; M. T. B. C., mean time break circuit.

## Record of trial of repaired chronometers, January 9 to July 11, 1892.

[In temperature room from January 9 to March 13; after that in chronometer room.]

Relative number.	Repaired by.	Time 1892.	Apr. 22 to May 2.	May 12 to May 22.	May 22 to June 1.	May 22 to June 11.	June 11 to June 21.	June 21 to July 1.	July 1 to July 11.	Temperature of compensation.	Temperature con- stant.	First trial number.	Final trial number.
		Temperature .....	67° 70	74° 77	72° 76	69° 92	78° 34	81° 32	82° 40	76° 79			
		Relative humidity, per cent.											
	<i>Chronometer-maker.</i>	No.											
1	Neg. John Hutton.	372	-0.389	-0.132	-0.335	-0.344	+0.142	+0.218	+0.330	-0.021	+0.0242	10,062	11,526
2	Neg. T. S. & J. D. Negus.	1596	+0.462	+0.543	+0.195	+0.369	+0.717	+0.543	+0.625	-0.064	+0.02581	10,421	12,854
3	Neg. do.	1036	-1.018	-0.982	-1.030	-1.069	-0.683	-0.732	-0.600	-0.827	+0.02581	12,530	13,392
4	Neg. John Bliss & Co.	2827	+1.452	+1.293	+1.170	+1.031	+1.467	+1.093	+1.230	+0.748	+0.02252	8,356	14,961
5	Neg. T. S. & J. D. Negus.	1195	-0.183	-0.407	-0.580	-0.644	-0.533	-0.807	-0.625	-0.602	+0.02537	12,102	16,387
6	Neg. do.	1317	+0.107	-0.157	-0.330	-0.144	+0.092	+0.298	+0.575	+0.123	+0.02581	12,613	17,378
7	Neg. do.	1300	+0.418	-0.352	-0.290	-0.144	+0.142	+0.018	0.000	-0.062	+0.02584	15,686	18,230
8	Neg. Wm. Bond & Son.	520	+2.532	+2.693	+2.420	+2.056	+3.142	+3.063	+3.325	+2.973	+0.02550	15,305	18,690
9	Neg. T. S. & J. D. Negus.	1697	-1.983	-2.252	-2.305	-2.244	-2.308	-2.392	-2.250	-2.577	+0.03347	16,944	19,015
10	Neg. T. S. & J. D. Negus, S. B. C.	1536	-0.186	+0.075	-0.108	-0.135	+0.376	+0.553	+0.785	+0.381	+0.03305	19,438	20,001
11	Neg. do.	1520	-1.494	-1.196	-1.383	-1.511	-1.141	-0.848	-0.464	-1.070	+0.03342	19,264	20,186
12	Neg. T. S. & J. D. Negus.	1244	-0.043	+0.043	-0.155	-0.269	-0.008	-0.132	-0.125	-0.352	+0.03342	17,044	20,518
13	Neg. do.	1268	-1.868	-1.657	-1.840	-1.944	-1.383	-1.182	-1.000	-1.477	+0.03331	17,314	20,487
14	Neg. do.	919	-2.743	-2.782	-2.935	-3.044	-2.938	-3.207	-3.075	-3.477	+0.03331	17,135	21,063
15	Neg. do.	1345	-1.583	-1.257	-1.355	-1.469	-0.958	-0.657	-0.550	-0.777	+0.03331	22,624	24,149
16	Neg. T. S. & J. D. Negus, S. B. C.	1039	-1.318	-1.182	-1.555	-1.994	-1.638	-1.752	-1.900	-2.227	+0.03223	15,162	25,338
17	Neg. T. S. & J. D. Negus.	1518	-0.711	-0.175	-0.533	-0.710	-0.634	-0.758	-1.110	-0.381	+0.03281	26,355	27,416
18	Neg. Wm. Bond & Son.	505	+0.382	+0.418	+0.195	+0.256	+0.342	+0.368	+0.500	+0.223	+0.03281	26,791	29,646
19	Neg. do.	1521	+0.307	+0.193	+0.145	+0.106	+0.167	+0.118	+0.200	+0.023	+0.03281	28,107	30,725
20	Neg. T. S. & J. D. Negus, S. B. C.	1267	-2.018	-1.757	-1.855	-1.919	-1.204	-0.982	-0.550	-0.877	+0.03391	28,107	30,725
21	Neg. T. S. & J. D. Negus, S. B. C.	1539	-2.113	+3.300	+2.942	+2.815	+3.451	+3.528	+3.810	+3.531	+0.03346	28,107	31,142
22	Neg. T. S. & J. D. Negus, S. B. C.	1528	+0.332	+0.593	+0.245	+0.256	+0.917	+0.968	+1.075	+0.623	+0.04463	31,799	33,890
23	Neg. Wm. Bond & Son.	572	+0.252	+0.793	+0.620	+0.356	+1.267	+1.363	+1.500	+0.386	+0.00012	37,676	38,960
24	Neg. do.	1308	+0.482	+0.643	+0.370	+0.356	+0.742	+0.618	+0.750	+0.386	+0.00165	42,547	44,996
25	Neg. T. S. & J. D. Negus, S. B. C.	1519	-0.037	+0.225	-0.357	-0.186	+0.201	+0.128	+0.160	+0.091	+0.00430	40,045	46,320
26	Neg. T. S. & J. D. Negus, S. B. C.	1519	-1.068	-1.107	-1.194	-1.194	-1.358	-1.132	-0.900	-1.280	+0.00137	46,510	52,391
27	Neg. T. S. & J. D. Negus, S. B. C.	1527	+1.637	+2.151	+1.792	+1.585	+2.051	+1.928	+2.010	+1.250	+0.00118	44,119	52,651
28	Neg. T. S. & J. D. Negus.	1126	+0.057	+0.168	+0.045	+0.056	+0.492	+0.618	+0.900	+0.623	+0.00115	47,924	51,994
29	Neg. T. S. & J. D. Negus, M. T. B. C.	1255	-0.143	+0.643	+0.295	+0.006	+0.642	+0.843	+1.050	-0.227	+0.00203	68,396	76,604

NOTE.—The sign + signifies a gaining rate. S. B. C. signifies sidereal break circuit. M. T. B. C., mean time break circuit.

## REPORT OF THE SUPERINTENDENT OF THE NAUTICAL ALMANAC.

NAUTICAL ALMANAC OFFICE,  
BUREAU OF EQUIPMENT, NAVY DEPARTMENT,  
*Washington, October 1, 1892.*

SIR: I have the honor to submit the following report of the work of this office during the past year:

## PRINTING.

The American Nautical Almanac for 1895 was issued in December, 1891. The American Ephemeris for 1895 was issued in June, 1892. The American Nautical Almanac for 1896 and the Pacific Coaster's Nautical Almanac for 1893 are now in press.

For reasons set forth in my last annual report the publication of the Atlantic Coaster's Nautical Almanac has been discontinued.

Of the Ephemeris and Nautical Almanac for 1896, 288 pages are now in type.

## DISTRIBUTION.

During the fiscal year ending June 30, 1892, the sale and distribution of publications have been as follows:

Publications.	Sold.	Distrib- uted.	Issued to to the public service.	Total issued.
American Ephemeris .....	662	632	710	2,004
American Nautical Almanac .....	2,098		240	2,338
Atlantic Coaster's Almanac .....	778		119	897
Pacific Coaster's Almanac .....	1,126		93	1,219
Astronomical Papers .....	10	832	24	866

The proceeds of sales, amounting to \$1,533.06, have, in compliance with law, been deposited in the Treasury to the account of the appropriation for public printing and binding.

## NEW TABLES OF PLANETS.

A great mass of minor computations has been necessary to complete the final comparisons of the observations of the Sun, Mercury, Venus, and Mars with the tabular places. In consequence, the equations of condition are not yet ready for solution, but the progress now being made is such that I expect them to be ready in the cases of the Sun and Mercury before the end of the present fiscal year.

Progress has also been made in the following investigations, the completion of which is necessary to the new tables:

(1) Discussion of the meridian observations of the Moon made at Greenwich and Washington since 1862, in order to determine the parallax inequality, and hence the solar parallax.

(2) Determination of the mass of Jupiter from the motions of Polyhymenion between its discovery in 1854 and the present time. The heaviest part of the computation pertaining to this work was completed several years since, but the complete discussion has been deferred until all the observations up to the end of 1888 were published.



(3) Discussion of all the published contact observations of the transits of Venus in 1874 and 1882. This work is extra official, except in being conducted by the Superintendent, the necessary computing assistance having been afforded by a gift from Miss C. W. Bruce, of New York City, through the intermediary of Prof. E. C. Pickering, director of the Harvard Observatory. As the work is intended to be utilized in the determination of data for the new tables, I deem it proper to report upon it to the Bureau. The comparison of the observed times with those computed from the tabular data is nearly complete, and the coefficients of the conditional equations are computed.

(4) Discussion of observations of  $\alpha$  Lyræ made with the prime vertical transit of the U. S. Naval Observatory during the years 1862 to 1867. These observations are historically remarkable from being the first to show clearly the revolution of the axis of rotation of the earth around its axis of figure, causing a fluctuation of the latitude of every point of the earth's surface, which was not discovered until twenty years later, and which has given rise to so much discussion during the past three years.

The foregoing investigations, together with a number of others relating to the determination of astronomical constants, are intended to form Volume V of the Astronomical Papers supplementary to the American Ephemeris.

Very respectfully, your obedient servant,

SIMON NEWCOMB,

*Professor, U. S. Navy, Superintendent Nautical Almanac.*

The CHIEF OF THE BUREAU OF EQUIPMENT,

*Navy Department.*

*Estimates of appropriations required for the service of the fiscal year ending June 30, 1894, by the Nautical Almanac office.*

Detailed objects of expenditure and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1893.
<b>SALARIES.</b>			
Salaries of assistants in preparing for publication the American Ephemeris and Nautical Almanac, viz:			
Three assistants, at \$1,600 each (Aug. 5, 1882, R. S. 22, p. 245, sec. 1; March 3, 1891, R. S. 26, p. 635, sec. 1) .....	\$4,800.00		
Two assistants, at \$1,400 each (same acts) .....	2,800.00		
Three assistants, at \$1,200 each (same acts) .....	3,600.00		
Two assistants, at \$1,000 each (same acts) .....	2,000.00		
One copyist and typewriter (same acts) .....	800.00		
One assistant messenger (same acts) .....	720.00		
One laborer (same acts) .....	660.00		
Pay of computers on piecework in preparing for publication the American Ephemeris and Nautical Almanac, and in improving the tables of the planets (same acts) ..	9,200.00		
		<b>\$24,680.00</b>	<b>\$24,680.00</b>
<b>MISCELLANEOUS EXPENSES.</b>			
Rent and fuel for Nautical Almanac office appropriated, R. S. 26, p. 935, sec. 1 .....		1,000.00	1,000.00

## ANNUAL REPORT OF THE NAVAL INSPECTOR OF ELECTRIC LIGHTING.

NAVY DEPARTMENT, BUREAU OF EQUIPMENT,  
Washington, D. C., August 1, 1892.

SIR: I have the honor to submit the following report of the work performed under the supervision of this office during the last year:

## PROGRESS OF NEW INSTALLATIONS.

During the past year the installations of electric lights on board the U. S. S. *Newark* and *Miantonomoh* have been completed and accepted; the installation on board the U. S. S. *Monterey* has been very nearly completed, the principal delay being on account of the search lights for this vessel. Work has been begun on the electric plants of the U. S. S. *New York*, *Detroit*, *Montgomery*, and *Bancroft*, but the progress on the installation of these plants has been slow on account of the delay experienced in obtaining material and apparatus from the electrical manufacturers. It is believed that the difficulties in this respect have been overcome, and that these plants can now be rapidly pushed to completion. Work on the plants of the U. S. S. *Marblehead*, *Machias*, *Castine*, and the harbor-defense ram and torpedo boat No. 2 has not yet been begun. In the case of the *Marblehead* this delay has in a measure been caused by the assignment of the contractors and the general delay in the completion of the vessel. The contract for the lighting plant has been given to the General Electric Company and work will soon be begun on this installation, and no further delay is anticipated.

In the case of the *Machias* and *Castine* the delay has been greater, and less confidence in the result is felt. The contract for these plants was awarded one year ago by the Bath Iron Works to a company that has never before done any Government work. Almost no progress has yet been made in the manufacture of apparatus and material for these plants, nor does much effort appear to have been made by the subcontractors to push this work. The contractors for the vessel have been repeatedly urged to have more rapid progress made, but so far without success.

The Harbor-Defense Ram and Torpedo Boat No. 2 are not yet sufficiently advanced in construction for work to be begun on their electric plants.

The contract for the electric plant for Torpedo Boat No. 2 has been awarded to the General Electric Company.

All the material necessary for the lighting plants of the U. S. S. *Maine*, *Texas*, *Cincinnati*, and *Raleigh*, excepting the dynamos and engines, has been delivered at the New York and Norfolk navy-yards, and preparations for beginning the work of installation on these vessels has been made. The dynamos and engines for these vessels will probably be ready for test during the present month.

Specifications have been issued for the electric plants of the U. S. S. *Columbia* and for cruisers Nos. 6 and 13, and for the battle ships *Massachusetts*, *Indiana*, and *Oregon*. Contracts have been made for the material and apparatus for cruiser No. 6. The contracts for the electric plants of the other vessels have not yet been awarded.

The light lists for the monitors *Amphitrite* and *Monadnock* have been prepared, and those for the *Puritan* and *Terror* will soon be ready. It is proposed to begin work on the electrical installations for these vessels very shortly, a part of the material necessary being already available.

#### ELECTRIC PLANTS IN COMMISSION.

The electric plants on most of the vessels in commission have given general satisfaction, notwithstanding the fact that the prevailing type of dynamo in use is poorly suited to the conditions on board ship. The wiring has given very little trouble, only one fault of any consequence having been reported, and that was due to the bad lead of the wires directly over the boilers.

Many of the voice pipes on several vessels, notably on the U. S. S. *San Francisco*, have been reported to be practically worthless owing to long length and numerous bends. These pipes should be replaced by telephones at the first favorable opportunity.

The ventilation of the dynamo rooms on board the U. S. S. *Charleston* and *Chicago* is not sufficient and needs attention. It has been found that a dynamo room is best ventilated and kept cool by forcing the air into it. On the U. S. S. *Philadelphia* there was found to be a marked difference in favor of this method over that of exhausting the air, with the same expenditure of energy. It is recommended that this system be applied to ventilating all dynamo rooms of vessels in commission, and especially to the two vessels named. All dynamo rooms of vessels now building will be ventilated in this way.

The dynamos and engines of the U. S. S. *Chicago*, *Boston*, and *Atlanta*, while having rendered good service in the past, should be replaced during the coming year. These generating sets are of the belted type, and occupy much valuable space; and besides not being so efficient as the standard marine sets, they are not sufficient for the needs of the vessels. The fixtures and wiring of these vessels should also be partially renewed, and standard apparatus introduced where possible.

The dynamo engine of the U. S. S. *Dolphin*, which was built for a speed of 800 revolutions per minute, has needed constant repairs. This set was an experimental one, and can not be said to have proved a success. A new generating set run at slower speed is needed for this vessel.

The dynamos and engines of the U. S. S. *Concord* and *Bennington* remain in the same unsatisfactory condition mentioned in my last report. The new engines and dynamos building by the Edison Company to replace those now on board have not yet been satisfactorily tested, but it is believed that they will be before long.

It is recommended that standard fixtures and wiring accessories be introduced on all vessels not so equipped. Especially is this change needed as regards sockets, since lamps are the most perishable part of an electric plant and uniformity in this respect is most needed.

A small electric plant is needed for the torpedo boat *Cushing*. None has been obtainable so far on account of the difficulty of getting a small dynamo engine designed to run without the use of oil in steam spaces. It is reported that great improvements have been made recently in steam turbines, and that these motors are now well adapted to the running of dynamos. It is recommended that steps be taken to procure a combination of this kind for trial on the *Cushing*.

The U. S. S. *Pensacola*, the last wooden vessel in our service lighted by electricity, was put out of commission during the year.

## STANDARD APPARATUS.

The policy outlined in my report for last year, that of standardizing and simplifying the sockets and fixtures for naval use, has been successfully followed, and has been extended to include all apparatus and material for the electric-lighting installation on new vessels of our Navy. The advantages of this policy need not be mentioned at length, the economy and simplicity obtained being sufficient reasons.

After repeated efforts a type of dynamo has at length been designed, which appears to embody the most important features necessary for reliable and efficient work on board ship. A type of dynamo engine has also been obtained, which is simple, strong, close regulating, and is operated without the use of lubricants in steam spaces.

A number of these sets are now building for the new vessels, and while not finally tested, the preliminary tests already made indicate that they will be much superior for naval work to any so far designed, either in this country or abroad.

All wiring accessories, such as junction boxes, water-tight switches and receptacles, deck and bulkhead stuffing tubes, etc., have been standardized, and a number have been made to conform to the standard specifications.

Standards for wire and molding have also been adopted, and it is thought that greater efficiency at less cost has been obtained. The lead covering for wire has been discarded as being unnecessary for wire with good insulation, it only adding to the weight and cost and to the labor of installation, without affording any appreciable protection to the wires.

## SEARCH LIGHTS.

A number of high-powered search-light projectors have been manufactured for the Navy Department in this country during the past year. In many respects these projectors and their lamps are improvements on those previously used on our vessels. The size and weight of the projectors should be reduced, and a few minor alterations made. Fourteen of these projectors built under contract with this Bureau have been completed, and will be tested very shortly. The lamps are of the inclined carbon type, and are well made and more satisfactory than any lamps of this type so far used in our service. It is thought that a lamp with horizontal carbons will give better results, and that possibly the differential type of lamp should be used. Experiments are now in progress which it is expected will settle these points.

## ELECTRICAL NIGHT SIGNALS.

The double-lantern system of night signals invented by Capt. Ardois of the Spanish navy has been extensively introduced in our service. A number of new sets of this type are now in process of construction, but numerous modifications have been made which it is thought will improve the apparatus. The keyboard has been made water-tight, and the switch put in the common return; the lanterns have been redesigned and are now water and smoke tight; and a new form of suspension has been adopted. Five double lanterns are still used, but four lanterns are thought to give sufficient number of combinations and to be better suited for all service and to be better in every way. Thirty combinations can be obtained with four lanterns, and this number is

sufficient for a comprehensive and flexible code and can be much more readily handled and learned than one of sixty-two combinations. Another item is the much smaller cost of the smaller sets.

It is recommended that the same type of signals be continued in use, but that only four double lanterns be used hereafter, and a simpler code. It will be a simple matter to alter the keyboards of the sets already in use, and the new system can be adopted with little friction or cost, if done at once.

#### MEANS OF INTERIOR COMMUNICATION.

The continued use of telephones on board ship only confirms the opinion expressed in my last report that these instruments are well adapted for use on shipboard. They cannot replace voice pipes entirely, but in many locations they are superior, and in these places they are being installed in new vessels.

A central station for interior signals has been established on all vessels now building, this feature having received the approval of the Department. This central station is located below the protective deck, just below the conning tower, and to it are led all means of communication which would be used during action. A large tube leads from the conning tower to this station. The commanding officer is thus able to give his orders and have them transmitted, without his attention being taken from the scene of action, and without the narrow limits of the conning tower being overcrowded. The means of communication are also better protected from injury by this plan. It is recommended that this feature be introduced on all new vessels of the Navy already in commission at the first favorable opportunity.

The necessity for telegraphs to the engine rooms by which small variations in the speed of the engines could be signalled, as distinguished from the functional telegraph for signalling "full speed," "half speed," etc., and to which attention was called in my last report, has been recognized by the Department, and such instruments are being installed on the vessels now building.

With these instruments are installed revolution indicators, which are designed to show automatically and continuously the number of revolutions being made by the main engines. Instruments of the same nature are required for signalling desired helm angles, and for indicating the position of the helm.

Instruments of this character are needed to give the commanding officer of a vessel full control of her movements. Several designs having been successfully tested and used abroad, and from the preliminary tests of the instrument now being installed on our vessels, it is believed that they are the equals of any.

A number of sets of helm and revolution indicators and telegraphs of this nature have been designed and successfully tested on shore. It is expected that a set of these instruments will be given a thorough trial under conditions of actual service before long.

In this connection your attention is respectfully called to the want of responsibility now existing in regard to the installation of the various means of communication on our naval vessels. This question has been referred to the Department for settlement, but so far no action has been taken. In the conflicts of authority which necessarily follow the present want of system the efficiency of this important part of the equipment of vessels can not fail to suffer.

## VENTILATING SETS.

It has been suggested that the compartments that are situated in the ends of vessels, and that are used only occasionally, could be better, more easily, and more economically ventilated by means of exhaustive fans driven by electric motors, than by the main ventilating system of the vessel. This suggestion appears to be a valuable one, and it is recommended that some official action be taken to determine this point.

The necessity has frequently been found for ventilating double bottoms and other restricted compartments when cleaning or painting, and no means have been available. During the year a portable ventilating set has been designed, consisting of a small exhaust fan driven by an electric motor. The set complete is compact and light, can be operated from any lamp socket, and can force sufficient air through 50 feet of hose to allow work to be carried on continuously in double bottoms, etc. A number of these sets are now being manufactured for issue.

## FOREIGN PRACTICE.

The complete and valuable report made by Lieut. J. B. Murdock, U. S. Navy, on the practice in foreign navies as regards electric lighting, telegraphs, signals, and search lights, the result of his trip through Europe during the past year, has been of much assistance in the adoption of standards for like apparatus for our own service, and in the general work of this office.

## RECOMMENDATIONS.

One of the most urgent needs of the service at present is a handbook on electricity and on electrical apparatus in general use on war vessels. All this information can be obtained only by diligent searching through many books, many of which are not available to most officers. It is earnestly recommended that such a handbook, containing briefly but clearly all the information that would be needed in general in operating an electrical plant on board ship, be compiled and issued under the direction of this Bureau.

The recommendations contained in my report for the last two years are again made, viz, that the rate of electrical machinist be established, the pay to be such as will attract and compensate suitable persons, the rating to be open to any enlisted man possessing the necessary qualifications; and that the services of a draftsman be obtained permanently for this Bureau.

Respectfully submitted.

J. S. NEWELL,  
*Commander, U. S. Navy, Naval Inspector of Electric Lighting.*  
The CHIEF OF BUREAU OF EQUIPMENT.

## Report of the Superintendent of Compasses.

NAVY DEPARTMENT,  
BUREAU OF EQUIPMENT, COMPASS OFFICE,  
Washington, August 12, 1892.

SIR: I have the honor to submit the following report of the work of this office during the past year, viz:

The instruments and other articles purchased for the Navy comprise: Twenty-five compensating binnacles, with magnet-correctors; 12 metal base plates for binnacles; 19 instrument stands for binnacles; 60 magnet-correctors for binnacles; 12 azimuth circles, new pattern; 6 peloruses (dumb compasses); 1 alidade (special); 12 Webster clinometers; 1 wrought-iron plate; 56 Weir azimuth diagrams; 25 Evans' Manuals, Deviation of the Compass; 1 magnetic-force instrument.

Repairs were made to two azimuth circles.

Of the above articles, the compensating binnacles were made under contract by Messrs. E. S. Ritchie & Sons, Brookline, Mass. The base plates, instrument stands, and magnets were required for binnacles purchased in the last and the previous fiscal years, and were not included in the contracts. The alidade (special) was fitted to the standard compass of the *Vesuvius*. The wrought-iron plate was required for instruction purposes in the office. The azimuth diagrams, Evans' Manuals, and magnetic-force instrument were purchased in England.

In addition, eighty-six cast-iron shells, for use as quadrantal correctors with binnacles, and twenty wrought-iron rods, for Flinder's correction of the *Miantonomoh's* compasses, were furnished by the New York navy-yard. An order was also placed with B. F. Stevens, London, for fifty Admiralty Manuals, latest edition, which has not yet been filled.

The magnetic-force instrument deserves special mention. Its use is described by Capt. Mayes, R. N. (late superintendent of compasses to the British admiralty), in a pamphlet furnished with the instrument. It performs the double office of determining the horizontal and vertical forces acting on the compass, and practically takes the place of two instruments now issued to the service, the horizontal-force instrument and the heeling adjuster.

In view of its compactness, reasonable cost, and efficiency, as determined by experiments in the office, I recommend its adoption by the Bureau for issue to the service.

The azimuth diagram, invented by Capt. Weir, England, enables the navigator to quickly obtain the true azimuth of a celestial body by inspection, and has been issued to each cruising vessel.

The supply of compasses on hand was sufficient to meet the demands of the service and no new ones were purchased during the year.

Compasses were located and approximately compensated on the *Bennington*, *Miantonomoh*, *Dolphin*, *Cushing*, and the tugs *Narkeeta*, *Wahnetta*, and *Iucana*. A special platform was erected on the *Miantonomoh* to accommodate the standard compass.

Certain changes were recommended in the material of local masses, such as ventilators, cowls, etc., to increase the efficiency of the compasses on the *Miantonomoh*, *Cincinnati*, *Raleigh*, *Maine*, *Detroit*, *Montgomery*, *Marblehead*, and practice cruiser.

A number of officers, under orders from the Department, were instructed during the year in practical compensation of the compass.

Compass reports, magnet surveys, and other observations relative to the compass were received from vessels in commission, in accordance with Bureau requirements. These reports have been verified, corrected, and discussed, and are filed away in the records of the office to be utilized for the information of the service when opportunity will allow.

Experiments have been continued in the office in anticipation of the problems that may arise in the ships now building, and it is confidently believed that their compass difficulties are well in hand and capable of ready correction.

I beg to renew my recommendation of last year that the office force be increased by the addition of at least two assistants, either naval officers or nautical experts, in order that the valuable information now on file may be published for the benefit of the service, in accordance with the usages of foreign navies.

Lieut. J. C. Gillmore has ably assisted in the performance of all the duties of the office.

Very respectfully,

S. W. B. DIEHL,

*Lieutenant, U. S. Navy, Superintendent of Compasses.*

**THE CHIEF OF THE BUREAU OF EQUIPMENT.**





# REPORT OF THE CHIEF OF THE BUREAU OF NAVIGATION.

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BUREAU OF NAVIGATION, NAVY DEPARTMENT.

Washington, October 25, 1892.

SIR: I have the honor to submit herewith a report (marked A) of the movements and duties of the ships of the Navy during the past year, a copy (marked B) of the report of the Superintendent of the Naval Academy, a copy (marked C) of the report of the Commandant of the Training Station, and a copy (marked D) of the report of the Hydrographer to the Bureau of Navigation.

Estimates for the support of the Bureau, the Naval Academy, the Training Station, the Naval War College and Torpedo School, and the Hydrographic Office are also submitted (marked E).

During the year the *Miantonomoh*, *Ranger*, *Adams*, *Dolphin*, and *Constellation* have been commissioned for service. The *Pensacola*, *Tallapoosa*, *Iroquois*, *Jamestown*, and *Enterprise* have been put out of commission.

The building for the Naval War College and Torpedo School on Coaster's Harbor Island, Newport, R. I., has been completed, and the college was opened September 1. Twenty-two officers are attending the course of instruction, which will continue until the 31st instant.

The survey for a telegraphic cable between California and the Hawaiian Islands, which was commenced by the *Albatross* in September, 1891, was completed by the *Thetis* in May, 1892.

In accordance with the provisions of the postal subsidy act, approved March 3, 1891, and at the request of the Postmaster-General, twenty American steamships have been inspected, tested for speed, and classified.

During the fiscal year ending June 30, 1892, 4,515 men and 830 apprentices were enlisted or re-enlisted in the Navy—1,389 men on board of cruising ships, 2,787 men and 830 apprentices on board of receiving ships and at ports where there are naval stations, 178 men for the Coast and Geodetic Survey, and 161 men for the vessels of the Fish Commission. One thousand and sixty-one men and 1,460 boys, candidates for enlistment on board of the receiving ships, were rejected for physical disqualifications. Three thousand five hundred and twenty men and 325 apprentices were discharged—2,231 by reason of expiration of enlistment, 130 for disability, 276 by reason of services being no longer required, 903 at their own request, 106 men by request of their commanding officers, 97 for bad conduct, 37 on account of illegal enlistment, and 65 for inaptitude. Nine hundred and eight men and 352

apprentices deserted during the year. Of this number 788 men and 339 apprentices deserted in home ports.

The number of enlisted men serving under continuous-service certificates June 30, 1892, was 1,637, an increase of 240 over the number serving on June 30, 1891.

Four thousand two hundred and forty-five dollars have been paid to enlisted men in prizes for target practice with great guns, machine guns, and small arms.

Under sections 4756 and 4757 of the Revised Statutes 33 pensions have been allowed and 26 disallowed.

The efficiency of the service demands that some changes shall be made in its personnel in order that the number of officers in the different grades shall be in keeping with the duties now required of them and with the character and number of vessels composing the Navy.

These changes are particularly needed in the line and in the Engineer Corps, but as special legislation for different corps is detrimental to the morale of the service, it is earnestly recommended that the necessary action be taken to effect a systematic reorganization of the entire personnel of the Navy.

Very respectfully,

F. M. RAMSAY,  
*Chief of Bureau.*

The SECRETARY OF THE NAVY.

# A.

## DETAILED STATEMENT OF VESSELS IN COMMISSION FOR SEA SERVICE.

### NORTH ATLANTIC SQUADRON.

*Rear-Admiral* BANCROFT GHERARDI, U. S. Navy, *Commander-in-Chief*, until September 9, 1892, U. S. S. *Philadelphia*, flagship; *Rear-Admiral* JOHN G. WALKER, U. S. Navy, *Commander-in-Chief*, from September 10, 1892, U. S. S. *Chicago*, flagship.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
<b>Philadelphia</b> , Capt. FREDERICK RODGERS, U. S. Navy, commanding; relieved by Capt. A. S. BARKER, U. S. Navy, on July 7, 1892.			
Navy-yard, N. Y.	Sept. 17, 1891	Nov. 3, 1891	New York, last report.
Tompkinsville.	Nov. 3, 1891	Nov. 9, 1891	
St. Thomas, W. I.	Nov. 9, 1891	Nov. 29, 1891	Cruising in the West Indies.
St. Johns, Antigua.	Nov. 30, 1891	Dec. 9, 1891	
St. Pierre, Martinique.	Dec. 10, 1891	Dec. 14, 1891	
Port Castries, St. Lucia.	Dec. 14, 1891	Dec. 16, 1891	
St. Thomas, W. I.	Dec. 18, 1891	Dec. 19, 1891	
Port au Prince, Haiti.	Dec. 22, 1891	Dec. 29, 1891	
Bridgetown, Barbados.	Jan. 2, 1892	Jan. 18, 1892	
Montevideo, Uruguay.	Feb. 6, 1892	Feb. 18, 1892	
Bridgetown, Barbados.	Mar. 8, 1892	Mar. 12, 1892	
St. Thomas, W. I.	Mar. 14, 1892	Mar. 23, 1892	
Kingston, Jamaica.	Mar. 26, 1892	Mar. 27, 1892	
Havana, Cuba.	Mar. 30, 1892	Apr. 4, 1892	
Matanzas, Cuba.	Apr. 4, 1892	Apr. 7, 1892	
Key West, Fla.	Apr. 8, 1892	May 5, 1892	
Savannah, Ga.	May 7, 1892	May 18, 1892	
Charleston, S. C.	May 18, 1892	May 21, 1892	
Annapolis, Md.	May 24, 1892	June 7, 1892	
New York, N. Y.	June 8, 1892	July 10, 1892	
Gardiner's Bay, L. I.	July 10, 1892	July 14, 1892	
New London, Conn.	July 14, 1892	Aug. 6, 1892	
New Harbor, Me.	Aug. 8, 1892	Aug. 23, 1892	
New Bedford, Mass.	Aug. 24, 1892	Aug. 28, 1892	Celebration at Gloucester.
New London, Conn.	Aug. 28, 1892	Sept. 5, 1892	
New York, N. Y.	Sept. 6, 1892	Sept. 11, 1892	
Annapolis, Md.	Sept. 12, 1892	Sept. 14, 1892	
Baltimore, Md.	Sept. 14, 1892	Sept. 17, 1892	Naval veterans' annual encampment.
Norfolk, Va.	Sept. 18, 1892	Sept. 18, 1892	
Newport, R. I.	Sept. 20, 1892	Sept. 24, 1892	
New York, N. Y.	Sept. 25, 1892		Naval parade, Oct. 12, 1892. Columbus celebration, Brooklyn, Oct. 21, 1892.
<b>Chicago</b> , U. S. flagship, Capt. J. MILLER, U. S. N., commanding; Relieved on July 27, 1892, by Capt. J. F. MCGLENSEY, U. S. N.			
New York.	Oct. 19, 1891	Dec. 2, 1891	At New York, last report.
Hampton Roads.	Dec. 3, 1891	Dec. 9, 1891	
Fort Amalie, St. Thomas.	Dec. 15, 1891	Dec. 16, 1891	
Castries, St. Lucia, W. I.	Dec. 18, 1891	Dec. 21, 1891	
Hampton, Barbados, W. I.	Dec. 22, 1891	Dec. 23, 1891	
Montevideo, Uruguay.	Jan. 10, 1892	Feb. 16, 1892	
Montevideo, Uruguay.	Feb. 18, 1892	Feb. 29, 1892	
Montevideo, Uruguay.	Feb. 29, 1892	Mar. 8, 1892	
Montevideo, Argentine Republic.	Mar. 9, 1892	Mar. 26, 1892	
Montevideo, Uruguay.	Mar. 27, 1892	Apr. 27, 1892	
St. Thomas, W. I.	May 16, 1892	May 16, 1892	
St. Thomas, W. I.	May 18, 1892	May 19, 1892	
Hampton, North River.	May 25, 1892	June 6, 1892	
New York navy-yard.	June 6, 1892	June 30, 1892	
New York.	July 2, 1892	July 10, 1892	
New York Bay.	July 11, 1892	July 12, 1892	
New York navy-yard.	July 13, 1892	July 21, 1892	
New York.	July 21, 1892	July 23, 1892	Naval militia drills.

## NORTH ATLANTIC SQUADRON—Continued.

of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
<b>CHICAGO—continued.</b>			
Navy-yard, New York	July 23, 1892	Sept. 3, 1892	To protect American inte
Port R. I.	Sept. 4, 1892	Sept. 9, 1892	
Navy-yard, New York	Sept. 9, 1892	Sept. 11, 1892	
Guayra, Venezuela	Sept. 19, 1892		
Antonomoh, Capt. M. SICARD, U. S. N., commanding.			
New York, N. Y.	Oct. 27, 1891	Jan. 1, 1892	Placed in commission (and assigned to the New Squadron.
Gardiner's Bay, L. I.	Jan. 4, 1892	Jan. 10, 1892	To Gardiner's Bay for targ
Navy-yard, New York	Jan. 11, 1892	May 25, 1892	
Delaware Breakwater	May 26, 1892	May 28, 1892	
Annapolis, Md.	May 28, 1892	June 4, 1892	
Norfolk, Va.	June 5, 1892	June 8, 1892	To Gardiner's Bay for targ
New York, N. Y.	June 9, 1892	June 27, 1892	
Gardiner's Bay, L. I.	June 28, 1892	July 13, 1892	
New London, Conn.	July 13, 1892	Aug. 6, 1892	
Gardiner's Bay, L. I.	Aug. 6, 1892	Aug. 10, 1892	Celebration at Gloucester.
Sakonnet River	Aug. 10, 1892	Aug. 11, 1892	
New Bedford, Mass.	Aug. 11, 1892	Aug. 16, 1892	
Nantucket Sound	Aug. 16, 1892	Aug. 17, 1892	
Boston, Mass.	Aug. 17, 1892	Aug. 24, 1892	Naval parade in New York Columbus celebration.
Gloucester, Mass.	Aug. 24, 1892	Aug. 29, 1892	
Provincetown, Mass.	Aug. 29, 1892	Aug. 31, 1892	
Vineyard Haven, Mass.	Aug. 31, 1892	Sept. 1, 1892	
New London, Conn.	Sept. 1, 1892	Sept. 13, 1892	Columbus celebration in B 21, 1892.
Huntington Bay, L. I.	Sept. 13, 1892	Sept. 14, 1892	
Throgs Point, N. Y.	Sept. 14, 1892	Sept. 15, 1892	
New York	Sept. 15, 1892	Oct. 15, 1892	
Stamford, Conn.	Oct. 17, 1892	Oct. 19, 1892	
New York	Oct. 20, 1892		
<b>Atlanta, Capt. J. W. PHILIP, U. S. N., commanding. Relieved by Capt. F. J. HIGGINSON, U. S. N., Dec. 9, 1891.</b>			
New York, N. Y.	Oct. 2, 1891	Oct. 11, 1891	At New York last repo
Delaware Breakwater	Oct. 14, 1891	Oct. 15, 1891	
New York navy-yard	Oct. 16, 1891	Nov. 19, 1891	
Yorktown, Va.	Nov. 21, 1891	Dec. 2, 1891	
Fort Monroe, Va.	Dec. 2, 1891	Dec. 3, 1891	
Norfolk navy-yard, Va.	Dec. 3, 1891	Dec. 7, 1891	
Fort Monroe, Va.	Dec. 7, 1891	Dec. 10, 1891	
St. Thomas, W. I.	Dec. 15, 1891	Dec. 16, 1891	
St. Castries, St. Lucia, W. I.	Dec. 18, 1891	Dec. 21, 1891	
Bridgetown, Barbados	Dec. 22, 1891	Dec. 23, 1891	
Bahia, Brazil	Jan. 4, 1892	Jan. 6, 1892	
Montevideo, Uruguay	Jan. 15, 1892	Feb. 9, 1892	
Do.	Feb. 29, 1892	Mar. 8, 1892	
Ensenada	Mar. 9, 1892	Mar. 26, 1892	
Montevideo, Uruguay	Mar. 27, 1892	Apr. 10, 1892	
Maldonado, Uruguay	Apr. 12, 1892	Apr. 24, 1892	
Montevideo, Uruguay	Apr. 25, 1892	May 3, 1892	
Bahia, Brazil	May 12, 1892	May 13, 1892	
Barbados (Bridgetown)	May 25, 1892	May 26, 1892	
St. Lucia	May 26, 1892	May 27, 1892	
St. Thomas (called)	May 29, 1892	May 29, 1892	Drilling naval r Convoys U. S.
New York	June 5, 1892	June 30, 1892	
Boston, Mass.	July 2, 1892	July 9, 1892	
New London, Conn.	July 10, 1892	July 12, 1892	
New York, N. Y.	July 13, 1892	July 16, 1892	Drilling naval Do.
Gravesend Bay, N. Y.	July 16, 1892	July 21, 1892	
Peckskill, N. Y.	July 21, 1892	July 23, 1892	
New York, N. Y.	July 23, 1892	Oct. 15, 1892	
Stamford, Conn.	Oct. 17, 1892	Oct. 19, 1892	Undergoing r Aug. 10, 189 Naval parade Transferred tion to the Sept. 2, 189 Columbus c
New York, N. Y.	Oct. 20, 1892		
<b>Rear Admiral, Commander HORACE ELMER, U. S. N., command- ing. Relieved by Command- er A. S. CROWNSHIELD, U. S. N., on March 27, 1892.</b>			
New York	Sept. 24, 1891	Sept. 25, 1891	
Do.	Sept. 26, 1891	Nov. 1, 1891	Hempster
Do.	Nov. 11, 1891	Nov. 21, 1891	Cruising

## NORTH ATLANTIC SQUADRON—Continued.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
<b>Kearsarge—continued.</b>			
St. Pierre, Martinique	Nov. 24, 1891	Dec. 1, 1891	
Port de France	Dec. 1, 1891	Dec. 4, 1891	
Port Castries, St. Lucia	Dec. 4, 1891	Dec. 9, 1891	
Kingstown, St. Vincent	Dec. 10, 1891	Dec. 14, 1891	
Kingstown, Barbados	Dec. 15, 1891	Dec. 16, 1891	
Kingstown, St. Vincent	Dec. 17, 1891	Dec. 17, 1891	
Port Castries, St. Lucia	Dec. 17, 1891	Dec. 18, 1891	
Kingstown, Barbados	Dec. 19, 1891	Dec. 29, 1891	
Port au Prince, Haiti	Jan. 6, 1892	Jan. 7, 1892	
Santo Domingo City	Jan. 10, 1892	Jan. 12, 1892	
Port au Prince, Haiti	Jan. 15, 1892	Feb. 17, 1892	
Port Antonio, Jamaica	Feb. 19, 1892	Feb. 22, 1892	
Port au Prince, Haiti	Feb. 24, 1892	Feb. 29, 1892	
Santo Domingo City	Mar. 3, 1892	Mar. 6, 1892	
Port au Prince, Haiti	Mar. 9, 1892	Mar. 12, 1892	
Key West, Fla.	Mar. 17, 1892	Mar. 31, 1892	
Havana, Cuba	Apr. 1, 1892	Apr. 4, 1892	
Key West, Fla.	Apr. 5, 1892	May 4, 1892	
Tybee Roads, Ga.	May 7, 1892	May 8, 1892	
Savannah, Ga.	May 8, 1892	May 18, 1892	May week celebration.
Port Royal, S. C.	May 18, 1892	May 19, 1892	
Charleston, S. C.	May 23, 1892	May 23, 1892	
Annapolis, Md.	May 23, 1892	June 7, 1892	
Hampton Roads, Va.	June 8, 1892	June 9, 1892	
Norfolk, Va.	June 9, 1892	June 1, 1892	
Navy-yard, Boston, Mass.	June 15, 1892	June 18, 1892	
Navy-yard, Portsmouth, N. H.	June 18, 1892	July 30, 1892	
New York	Aug. 1, 1892	Aug. 7, 1892	
Port au Prince, Haiti	Aug. 14, 1892	Aug. 17, 1892	To protect American interests.
Santo Domingo City	Aug. 20, 1892	Aug. 20, 1892	
Savanna Island	Aug. 22, 1892	Aug. 22, 1892	
Port Antonio, Jamaica	Aug. 23, 1892	Aug. 30, 1892	
Santo Domingo City	Sept. 2, 1892	Sept. 2, 1892	
Savanna Island	Sept. 5, 1892	Sept. 5, 1892	
Port au Prince, Haiti	Sept. 6, 1892	Sept. 8, 1892	
Curaçao	Sept. 14, 1892	Sept. 15, 1892	
La Guayra, Venezuela	Sept. 16, 1892	Sept. 22, 1892	To protect American interests.
Puerto Cabello, Venezuela	Sept. 23, 1892	Sept. 23, 1892	
Vela de Coro, Venezuela	Sept. 24, 1892	Sept. 24, 1892	
Puerto Cabello, Venezuela	Sept. 25, 1892	Sept. 28, 1892	
La Guayra, Venezuela	Sept. 28, 1892	Sept. 29, 1892	
Puerto Cabello, Venezuela	Sept. 30, 1892		
<b>Concord, Commander O. A. BATCHELLER, U. S. N., commanding. Relieved by Commander EDWIN WHITE, U. S. N., on April 27, 1892.</b>			
Navy-yard, Brooklyn, N. Y.	Sept. 11, 1891	Nov. 17, 1891	At Navy-yard, New York, last report.
Ansonville, Staten Island	Nov. 17, 1891	Nov. 18, 1891	
Mass., D. W. I.	Nov. 23, 1891	Nov. 28, 1891	Cruising in the West Indies.
Rocksted, Santa Cruz, W. I.	Nov. 28, 1891	Dec. 7, 1891	
Thomas, D. W. I.	Dec. 7, 1891	Dec. 8, 1891	
Pierre, Martinique, W. I.	Dec. 10, 1891	Dec. 13, 1891	
Kingstown, Barbados, W. I.	Dec. 14, 1891	Dec. 14, 1891	
Port Castries, St. Lucia, W. I.	Dec. 15, 1891	Dec. 15, 1891	
Port au Prince, St. Vincent, W. I.	Dec. 15, 1891	Dec. 16, 1891	
Mass., D. W. I.	Dec. 18, 1891	Dec. 19, 1891	
Port au Prince, Haiti	Dec. 22, 1891	Dec. 28, 1891	
Port au Prince, Haiti	Dec. 28, 1891	Dec. 28, 1891	
Port au Prince, Haiti	do	Dec. 29, 1891	
Kingstown, Barbados	Jan. 2, 1892	Jan. 14, 1892	
Kingstown, Barbados	Jan. 27, 1892	Jan. 30, 1892	
Port au Prince, Uruguay	Feb. 6, 1892	Feb. 18, 1892	
Kingstown, Barbados	Mar. 8, 1892	Mar. 15, 1892	
Mass., D. W. I.	Mar. 17, 1892	Mar. 23, 1892	
Port au Prince, Jamaica	Mar. 26, 1892	Mar. 27, 1892	
Port au Prince, Cuba	Apr. 4, 1892	Apr. 7, 1892	
Port au Prince, Fla.	Apr. 8, 1892	Apr. 23, 1892	
Port au Prince, La	Apr. 27, 1892	Apr. 29, 1892	
Port au Prince, La	Apr. 28, 1892	Apr. 30, 1892	Made a trip up the Mississippi River.
Port au Prince, La	Apr. 30, 1892	May 1, 1892	
Port au Prince, La	May 1, 1892	May 2, 1892	
Port au Prince, La	May 2, 1892	May 3, 1892	
Port au Prince, La	May 3, 1892	May 4, 1892	
Port au Prince, La	May 4, 1892	May 5, 1892	
Port au Prince, La	May 5, 1892	May 6, 1892	
Port au Prince, La	May 6, 1892	May 7, 1892	

## NORTH ATLANTIC SQUADRON—Continued.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
CONCORD—continued.			
Memphis, Tenn.	May 7, 1892	May 14, 1892	
Island No. 25.	May 14, 1892	May 15, 1892	
Island No. 6.	May 15, 1892	May 16, 1892	
Cairo, Ill.	May 16, 1892	May 20, 1892	
O'Donnell's Landing, Ark.	May 20, 1892	May 21, 1892	
Friar's Point, Miss.	May 21, 1892	May 22, 1892	
Greenville, Miss.	May 22, 1892	May 24, 1892	
Vicksburg, Miss.	May 24, 1892	May 27, 1892	
Natchez, Miss.	May 27, 1892	May 30, 1892	
Baton Rouge, La.	May 30, 1892	June 1, 1892	
Donaldsonville, La.	June 1, 1892	June 2, 1892	
New Orleans, La.	June 2, 1892	June 4, 1892	
Key West, Fla.	June 6, 1892	June 8, 1892	
New York.	June 13, 1892	June 17, 1892	
Off Nantucket Light, Great Point	June 18, 1892	June 19, 1892	
Boston, Mass.	June 20, 1892		
Boston, Mass.		July 11, 1892	
Gardiner's Bay, Long Island, N. Y.	July 12, 1892	July 14, 1892	
New London, Conn.	July 14, 1892	Aug. 6, 1892	
Bar Harbor, Me.	Aug. 8, 1892	Aug. 23, 1892	
Gloucester, Mass.	Aug. 24, 1892	Aug. 28, 1892	
New London, Conn.	Aug. 28, 1892	Aug. 29, 1892	
Hempstead, Long Island, N. Y.	Aug. 29, 1892	Aug. 30, 1892	
New York.	Aug. 30, 1892	Sept. 1, 1892	
St. Thomas, Danish West Indies.	Sept. 8, 1892	Sept. 8, 1892	
La Guayra, Venezuela.	Sept. 10, 1892	Sept. 15, 1892	To protect American interests.
Puerto Cabello, Venezuela.	Sept. 16, 1892	Sept. 17, 1892	
La Guayra, Venezuela.	Sept. 17, 1892	Sept. 20, 1892	
Puerto Cabello, Venezuela.	Sept. 21, 1892	Sept. 23, 1892	
Curaçao, Dutch West Indies.	Sept. 24, 1892	Sept. 25, 1892	
Aspinwall, United States of Colombia.	Sept. 28, 1892	Sept. 30, 1892	To protect American interests.
Carthagena.	Oct. 1, 1892	Oct. 4, 1892	
Aspinwall.	Oct. 5, 1892		
<b>Vesuvius</b> , Lieut. SEATON SCHROEDER, U. S. N., commanding.			
New London, Conn.	Oct. 1, 1891	Oct. 26, 1891	At New London last report.
Alexandria, Va.	Oct. 28, 1891	Oct. 29, 1891	
Navy-yard, Washington, D. C.	Oct. 29, 1891	Nov. 16, 1891	
Navy-yard, Norfolk, Va.	Nov. 18, 1891	Jan. 1, 1892	
New York, N. Y.	Jan. 2, 1892	May 7, 1892	
Savannah, Ga.	May 11, 1892	May 18, 1892	May week celebration.
Charleston, S. C.	May 19, 1892	May 21, 1892	
Annapolis, Md.	May 24, 1892	June 7, 1892	
New York, N. Y.	June 9, 1892	July 3, 1892	
Cape May City.	July 4, 1892	July 5, 1892	Fourth of July celebration.
Navy Yard, New York.	July 5, 1892	July 15, 1892	
New London, Conn.	July 15, 1892	Aug. 6, 1892	
Bar Harbor, Me.	Aug. 8, 1892	Aug. 23, 1892	Gloucester celebration.
Gloucester, Mass.	Aug. 24, 1892	Aug. 28, 1892	
New London, Conn.	Aug. 29, 1892	Sept. 12, 1892	
Baltimore, Md.	Sept. 15, 1892	Sept. 17, 1892	Naval Veteran's Encampment.
Washington, D. C.	Sept. 18, 1892	Sept. 27, 1892	
Navy-yard, N. Y.	Sept. 28, 1892	Oct. 15, 1892	Oct. 12, naval parade, New York.
Stamford, Conn.	Oct. 17, 1892	Oct. 19, 1892	Columbus Celebration.
Navy-yard, N. Y.	Oct. 20, 1892		

## SQUADRON FOR SPECIAL SERVICE.

**Rear-Admiral BANCROFT GHERARDI**, U. S. N., *Commander-in-Chief*. (Assumed command Sept. 22, 1892.) U. S. S. *Baltimore*, flagship.

<b>Baltimore</b> , Capt. W. S. SCHLEY, U. S. N., commanding. Relieved by Capt. WILLIAM WHITEHEAD, U. S. N., on February 24, 1892. Relieved by Capt. W. R. BRIDGMAN, U. S. N., on June 25, 1892.			
Valparaiso, Chile.	Sept. 14, 1891	Dec. 11, 1891	At Valparaiso, Chile, last report.
Callao, Peru.	Dec. 15, 1891	Dec. 19, 1891	
Navy-yard, Mare Island, Cal.	Jan. 5, 1892	Apr. 6, 1892	
San Francisco, Cal.	Apr. 6, 1892	Apr. 9, 1892	
San Diego, Cal.	Apr. 12, 1892	Apr. 30, 1892	

## SQUADRON FOR SPECIAL SERVICE—Continued.

Name of vessel and port visited.	Date of arrival.	Date of departure.	Remarks.
BALTIMORE—continued.			
Astoria, Oregon .....	May 5, 1892	May 13, 1892	Cruising in Puget Sound.
Portland, Oregon .....	May 14, 1892	May 31, 1892	
Astoria, Oregon .....	May 31, 1892	June 1, 1892	
Port Townsend, Wash. ....	June 2, 1892	June 7, 1892	
Seattle, Wash. ....	June 7, 1892	June 8, 1892	
Fairhaven, Wash. ....	June 8, 1892	June 11, 1892	
Seattle, Wash. ....	June 11, 1892	June 17, 1892	
Olympia, Wash. ....	June 17, 1892	June 25, 1892	
Tacoma, Wash. ....	June 25, 1892	Aug. 7, 1892	
Salmon, Wash. ....	Aug. 7, 1892	Aug. 12, 1892	
Port Townsend, Wash. ....	Aug. 12, 1892	Aug. 16, 1892	
San Francisco, Cal. ....	Aug. 19, 1892	Aug. 21, 1892	
Navy-yard, Mare Island, Cal. ....	Aug. 21, 1892	Sept. 25, 1892	
San Diego, Cal. ....	Sept. 27, 1892		
Rodondo. ....	Oct. 8, 1892		
Mazatlan. ....	Oct. 15, 1892		
Acapulco. ....	Oct. 21, 1892		
SAN FRANCISCO, Capt. W. T. SAMPSON, U. S. Navy, Commanding. On July 2, 1892, Capt. J. C. WATSON, U. S. N., assumed command.			
Callao, Peru .....	Oct. 2, 1891	Oct. 28, 1891	At Callao last report.
Acapulco, Mexico. ....	Nov. 8, 1891	Nov. 10, 1891	
San Francisco, Cal. ....	Nov. 19, 1891	Nov. 20, 1891	To protect American interests.
Mare Island, Cal. ....	Nov. 20, 1891	Dec. 22, 1891	
San Francisco, Cal. ....	Dec. 22, 1891	Dec. 26, 1891	
San Diego, Cal. ....	Dec. 28, 1891	Feb. 18, 1892	
Honolulu, H. I. ....	Feb. 27, 1892	Aug. 27, 1892	
San Francisco, Cal. ....	Sept. 5, 1892	Sept. 7, 1892	
Mare Island, Cal. ....	Sept. 7, 1892	Oct. 1, 1892	
Rodondo. ....	Oct. 8, 1892		
Mazatlan. ....	Oct. 15, 1892		
Acapulco. ....	Oct. 21, 1892		
Charleston, Capt. GEORGE C. EMEY, U. S. N., commanding. Relieved by Capt. H. F. PICKENS, U. S. N., March 11, 1892.			
Yokohama, Japan. ....	Sept. 21, 1891	Oct. 13, 1891	Flagship of Rear-Admiral G. E. Belknap, U. S. N., commander-in-chief, Asiatic Squadron.
Kobe, Japan .....	Oct. 14, 1891	Oct. 17, 1891	November 16, 1891. Rear-Admiral G. E. Belknap transferred his flag to the Marion.
Nagasaki, Japan .....	Oct. 18, 1891	Oct. 22, 1891	
Wosung, China .....	Oct. 24, 1891	Nov. 4, 1891	Assigned to the Pacific Squadron.
Yokohama, Japan. ....	Nov. 8, 1891	Nov. 18, 1891	
Honolulu, H. I. ....	Dec. 4, 1891	Dec. 17, 1891	
San Diego, Cal. ....	Dec. 31, 1891	Jan. 19, 1892	
Navy-yard, Mare Island, Cal. ....	Jan. 21, 1892	Mar. 14, 1892	
San Diego, Cal. ....	Mar. 17, 1892	Apr. 14, 1892	
Coronado Beach, Cal. ....	Apr. 14, 1892	Apr. 16, 1892	
San Barbara, Cal. ....	Apr. 17, 1892	Apr. 24, 1892	
Coronado Beach, Cal. ....	Apr. 25, 1892	Apr. 26, 1892	
San Diego, Cal. ....	Apr. 26, 1892	Apr. 28, 1892	
San Francisco, Cal. ....	Apr. 30, 1892	May 4, 1892	
Astoria, Oregon .....	May 7, 1892	May 13, 1892	
Grims Island, Columbia .....	May 13, 1892	May 14, 1892	
Portland, Oregon .....	May 14, 1892	June 8, 1892	
Seattle, Wash. ....	June 8, 1892	June 9, 1892	
Port Townsend, Wash. ....	June 9, 1892	June 10, 1892	
Seattle, Wash. ....	June 11, 1892	June 16, 1892	
Seattle, Wash. ....	June 16, 1892	June 17, 1892	
Seattle, Wash. ....	June 17, 1892	June 25, 1892	
Seattle, Wash. ....	June 25, 1892	June 30, 1892	
Seattle, Wash. ....	June 30, 1892		
Charleston, S. C. ....	July 14, 1892		
San Francisco, Cal. ....	July 31, 1892		
San Francisco, Cal. ....	Aug. 15, 1892		
San Francisco, Cal. ....	Sept. 28, 1892		
San Francisco, Cal. ....	Oct. 8, 1892		
San Francisco, Cal. ....	Oct. 15, 1892		
San Francisco, Cal. ....	Oct. 21, 1892		



## ASIATIC SQUADRON.

*Rear-Admiral* GEORGE E. BELKNAP, U. S. Navy *Commander-in-Chief*, on February 20, 1892, relieved by *Rear-Admiral* D. B. HARMONY, U. S. Navy.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
<b>Lancaster</b> , U. S. flagship, Capt. H. B. Seely, U. S. Navy, commanding. Relieved on June 9, 1892, by Capt. A. H. McCORMICK, U. S. Navy.			
Cape Town, Cape Colony.....	Oct. 9, 1891	Oct. 24, 1891	At Cape Town last report.
Ratavia.....	Dec. 7, 1891	Dec. 9, 1891	En route to China to become flagship of the Asiatic station.
Singapore, India.....	Dec. 13, 1891	Dec. 21, 1891	
Hongkong, China.....	Jan. 4, 1892	Apr. 12, 1892	
Nagasaki, Japan.....	Apr. 21, 1892	May 10, 1892	
Kobe, Japan.....	May 13, 1892		
Shanghai.....	Oct. 6, 1892		
<b>Marion</b> , Commander J. R. BARTLETT, U. S. N., commanding. Relieved by Commander C. V. GRIDLEY, U. S. N., on July 21, 1892.			
Honolulu, H. I.....	Sept. 26, 1891	Oct. 3, 1891	At Honolulu last report. Under orders to join the Asiatic squadron.
Yokohama, Japan.....	Nov. 2, 1891	Dec. 8, 1891	Flag of commander-in-chief temporarily transferred to this vessel Oct. 25, 1891.
Simidsu, Japan.....	Dec. 10, 1891	Dec. 11, 1891	On March 12, 1892, transferred flag of commander-in-chief to the United States steamship Lancaster.
Yokohama, Japan.....	Dec. 14, 1891	Apr. 12, 1892	
Yokosuka, Japan.....	Apr. 12, 1892	May 4, 1892	
Yokohama, Japan.....	May 4, 1892	May 9, 1892	
Kobe, Japan.....	May 11, 1892	May 17, 1892	
Cheumulpo, Korea.....	May 24, 1892	June 1, 1892	
Tschi fu, China.....	June 3, 1892	June 5, 1892	
Off Taku Bar, China.....	June 6, 1892	June 7, 1892	
Shanghai, China.....	June 11, 1892	June 16, 1892	
Nagasaki, Japan.....	June 19, 1892		
Yokohama.....	Aug. 19, 1892		
<b>Alert</b> , Commander R. D. HITCHCOCK, U. S. N., commanding.			
Yokohama, Japan.....	Oct. 5, 1891	Oct. 10, 1891	At Yokohama last report.
Nagasaki, Japan.....	Oct. 14, 1891	Oct. 14, 1891	
Shanghai, China.....	Oct. 16, 1891	Nov. 3, 1891	
Amoy, China.....	Nov. 6, 1891	Nov. 14, 1891	
Hongkong, China.....	Nov. 15, 1891	Nov. 19, 1891	
Canton, China.....	Nov. 19, 1891	Dec. 16, 1891	
Hongkong, China.....	Dec. 19, 1891	Dec. 21, 1891	
Canton, China.....	Dec. 21, 1891		
Hongkong, China.....	Jan. 6, 1892	Jan. 27, 1892	
Canton, China.....	Jan. 28, 1892	Feb. 8, 1892	
Hongkong, China.....	Feb. 9, 1892		
Nagasaki, Japan.....	Apr. 7, 1892	Apr. 10, 1892	
Kobe, China.....	Apr. 13, 1892	May 22, 1892	
Tschi fu, China.....	May 28, 1892	June 7, 1892	
Cheumulpo, Korea.....	June 10, 1892	June 20, 1892	
Chelatan, Ping Yang, Korea.....	June 22, 1892	June 27, 1892	
Huichuan, China.....	June 29, 1892	July 1, 1892	
Nagasaki, Japan.....	Aug. 19, 1892		
<b>Secretary</b> , Commander F. M. ARBEN, U. S. N., commanding.			
Shanghai, China.....	Oct. 17, 1891	Oct. 23, 1891	At Shanghai last report.
Amoy, China.....	Oct. 23, 1891	Oct. 25, 1891	
Shanghai, China.....	Oct. 25, 1891	Nov. 6, 1891	
Kow, China.....	Nov. 12, 1891	Nov. 19, 1891	
in Kiang, China.....	Nov. 19, 1891	Nov. 22, 1891	
in China.....	Nov. 23, 1891	Nov. 25, 1891	
in Kiang, China.....	Nov. 25, 1891	Dec. 2, 1891	
Shanghai, China.....	Dec. 3, 1891	Jan. 21, 1892	
in Kiang, China.....	Jan. 23, 1892	Feb. 16, 1892	
in China.....	Feb. 17, 1892	May 22, 1892	Left Shanghai May 7 for target practice and drills. Returned to port May 12.
in China.....	May 20, 1892		
in China.....		Aug. 25, 1892	

## ASIATIC SQUADRON—Continued.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks
<b>Petrel</b> , Lieut. Commander M. R. S. MACKENZIE, U. S. Navy, commanding:			
Navy-yard, New York.....	Sept. 11, 1891	Nov. 1, 1891	At New York, last report. On October 21, 1891, detached from North Atlantic station and ordered to duty in Asiatic station.
Sandy Hook.....	Nov. 1, 1891	Nov. 3, 1891	En route to China.
Port Castries, St. Lucia, W. I.....	Nov. 13, 1891	Nov. 14, 1891	
Gibraltar, Spain.....	Dec. 7, 1891	Dec. 12, 1891	
Port Said, Egypt.....	Dec. 20, 1891	Dec. 30, 1891	
Aden, Arabia.....	Jan. 6, 1892	Jan. 9, 1892	
Colombo, Ceylon.....	Jan. 20, 1892	Jan. 24, 1892	
Singapore, Straits Settlements.....	Feb. 2, 1892	Feb. 9, 1892	
Bangkok, Siam.....	Feb. 14, 1892	Feb. 28, 1892	
Saigon, Cochin China.....	Mar. 5, 1892	Mar. 14, 1892	
Hongkong, China.....	Mar. 19, 1892	Mar. 23, 1892	
Shanghai, China.....	Mar. 30, 1892	May 9, 1892	
Chin Kiang, China.....	May 30, 1892	May 30, 1892	
Wuhu, China.....	do	June 15, 1892	
Kin Kiang, China.....	June 16, 1892		
Han Kow, China.....	Sept. 10, 1892		
<b>Palos</b> , Lieut. Commander J. C. RICH, U. S. N., commanding. On July 25, 1892, relieved by Lieut. J. J. HENKER, U. S. N.			
Shanghai, China.....	Sept. 8, 1891	Nov. 1, 1891	At Shanghai, last report.
Wusung, China.....	Nov. 1, 1891	do	
Shanghai, China.....	do	Nov. 3, 1891	
Yang-tse River, China.....	Nov. 3, 1891	Nov. 5, 1891	
Tschin Kiang, China.....	Nov. 5, 1891	Nov. 6, 1891	
Nanking, China.....	Nov. 6, 1891	Nov. 10, 1891	
Shanghai, China.....	Nov. 17, 1891	Dec. 2, 1891	
Taku Bar, China.....	Dec. 7, 1891	Dec. 10, 1891	
Teng Tschou, China.....	Dec. 10, 1891	Dec. 11, 1891	
Taku, China.....	Dec. 11, 1891	Dec. 15, 1891	
Teng Tschou, China.....	Dec. 15, 1891	May 10, 1892	
Tien Tsin, China.....	May 10, 1892	June 3, 1892	
Taku Bar, China.....	June 7, 1892	June 7, 1892	
Shanghai, China.....	June 11, 1892	June 16, 1892	
Nagasaki, Japan.....	June 13, 1892		At Nagasaki, July 10, 1892.

## PACIFIC SQUADRON.

Rear Admiral GEORGE BROWN, U. S. N., *Commander-in-Chief* (U. S. S. *San Francisco* flagship) until September 17, 1892, from which date the U. S. S. *Thetis* was made temporary flagship).

<b>Mohican</b> , Commander C. S. COTTON, U. S. N., commanding. Relieved by Commander H. L. JOHNSON, U. S. N., on April 28, 1892.			
Ililiuk, Unalaska.....	Sept. 30, 1891	Oct. 8, 1891	At Unalaska, last report.
San Francisco, Cal.....	Oct. 25, 1891	Oct. 27, 1891	
Navy-yard, Mare Island, Cal.....	Oct. 27, 1891	Mar. 9, 1892	
Port Townsend, Wash.....	Mar. 14, 1892	Mar. 15, 1892	
Seattle, Wash.....	Mar. 15, 1892	Mar. 19, 1892	
U. S. Naval Station, Port Orchard, Wash.....	Mar. 19, 1892	Apr. 8, 1892	Cruising in Puget Sound.
Seattle, Wash.....	Apr. 8, 1892	Apr. 9, 1892	
Esquimalt, B. C.....	Apr. 9, 1892	Apr. 18, 1892	
Port Townsend, Wash.....	Apr. 18, 1892	Apr. 20, 1892	
Seattle, Wash.....	Apr. 20, 1892	Apr. 23, 1892	
Tacoma, Wash.....	Apr. 23, 1892	Apr. 30, 1892	
Olympia, Wash.....	Apr. 30, 1892	May 4, 1892	
Tacoma, Wash.....	May 4, 1892	May 7, 1892	
Seattle, Wash.....	May 7, 1892	May 9, 1892	
Port Townsend, Wash.....	May 9, 1892	May 13, 1892	Ordered to Behring Sea for duty in connection with the seal fisheries.
Sitka, Alaska.....	May 17, 1892	May 23, 1892	
Unalaska, Alaska.....	May 30, 1892	June 2, 1892	
Sitka, Alaska.....	June 11, 1892	June 14, 1892	Cruising.
Port Etches, Alaska.....	June 16, 1892	June 21, 1892	
Sitka, Alaska.....	June 23, 1892	June 25, 1892	

## PACIFIC SQUADRON—Continued.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
<b>Ranger</b> , Commander H. E. Nichols, U. S. N., commanding.			
Mare Island, Cal. ....		May 7, 1892	Placed in commission Apr. 26, 1892.
San Francisco, Cal. ....	May 7, 1892	May 11, 1892	
Port Townsend ....	May 16, 1892	May 17, 1892	
Seattle ....	May 17, 1892	May 27, 1892	
Port Townsend ....	May 27, 1892	June 19, 1892	
Sitka, Alaska ....	June 27, 1892	June 27, 1892	Sailed for Bering Sea. Cruising in Bering Sea.
San Francisco, Cal. ....	Oct. 13, 1892		
Mare Island, Cal. ....	Oct. 15, 1892		

## SOUTH ATLANTIC SQUADRON.

*Rear-Admiral A. E. K. BENHAM, U. S. N., Commander-in-Chief, U. S. S. Newark, flagship.*

<b>Newark</b> , U. S. flagship, Capt. SILAS CASEY, U. S. N., commanding.			
New London, Conn. ....	Sept. 25, 1891	Oct. 22, 1891	At New London, last report.
Boston, Mass. ....	Oct. 24, 1891	Nov. 18, 1891	
New York, N. Y. ....	Nov. 21, 1891	Dec. 1, 1891	
Yorktown, Va. ....	Dec. 3, 1891	Dec. 5, 1891	
Fortress Monroe, Va. ....	Dec. 5, 1891	Dec. 9, 1891	Dec. 8, 1891, detached from the Squadron of Evolution.
Norfolk, Va. ....	Dec. 9, 1891	Jan. 16, 1892	
Yorktown, Va. ....	Jan. 16, 1892	Feb. 18, 1892	
Hampton Roads, Va. ....	Feb. 18, 1892	Feb. 19, 1892	
Norfolk, Va. ....	Feb. 19, 1892	Mar. 14, 1892	Mar. 11, 1892, assigned to North Atlantic Squadron.
Hampton Roads, Va. ....	Mar. 14, 1892	do	
St. Thomas, W. I. ....	Mar. 19, 1892	Mar. 22, 1892	
La Guayra, Venezuela ....	Mar. 24, 1892	Apr. 11, 1892	
Puerto Cabello, Venezuela ....	Apr. 11, 1892	Apr. 12, 1892	Cruising in the West Indies.
Santa Anna Curaçao ....	Apr. 13, 1892	Apr. 19, 1892	
La Guayra, Venezuela ....	Apr. 20, 1892	Apr. 30, 1892	
Key West, Fla. ....	May 5, 1892	May 12, 1892	
Tybee Roads, Ga. ....	May 14, 1892	May 18, 1892	
Charleston, S. C. ....	May 18, 1892	May 21, 1892	
Annapolis, Md. ....	May 24, 1892	June 5, 1892	
Norfolk, Va. ....	June 5, 1892	June 16, 1892	
Hampton Roads, Va. ....	June 16, 1892	June 17, 1892	
Norfolk, Va. ....	June 17, 1892	July 17, 1892	
Cadiz, Spain ....	July 30, 1892	Aug. 2, 1892	
Huelva, Spain ....	Aug. 2, 1892	Aug. 3, 1892	
Cadiz, Spain ....	Aug. 3, 1892	Aug. 16, 1892	
Gibraltar ....	Aug. 16, 1892	Aug. 19, 1892	
Cartagena, Spain ....	Aug. 20, 1892	Aug. 22, 1892	
Barcelona, Spain ....	Aug. 23, 1892	Aug. 29, 1892	
Toulon, France ....	Aug. 30, 1892	Sept. 1, 1892	
Genoa, Italy ....	Sept. 2, 1892	Sept. 25, 1892	
Villefranche, France ....	Sept. 25, 1892		Columbus celebration.
Cadiz, Spain ....	Oct. 6, 1892		
Gibraltar ....	Oct. 30, 1892		
<b>Essex</b> , Commander A. S. SNOW, U. S. N., commanding. Relieved on May 16, 1892, by Commander W. W. MEADE, U. S. N.			
Buenos Ayres, Argentine Republic. ....	May 22, 1891	Sept. 10, 1891	At Buenos Ayres, last report.
Colonia, Uruguay ....	Sept. 11, 1891	Sept. 25, 1891	
Montevideo, Uruguay ....	Sept. 26, 1891	Oct. 7, 1891	
Buenos Ayres, Argentine Republic. ....	Oct. 8, 1891	Nov. 9, 1891	
Colonia, Uruguay ....	Nov. 10, 1891	Nov. 15, 1891	
Montevideo, Uruguay ....	Nov. 15, 1891	Dec. 12, 1891	
Colonia, Uruguay ....	Dec. 13, 1891	Dec. 18, 1891	
Buenos Ayres, Argentine Republic. ....	Dec. 18, 1891	Jan. 20, 1892	
Montevideo, Uruguay ....	Jan. 21, 1892	Feb. 26, 1892	
Maldonado, Uruguay ....	Feb. 27, 1892	Mar. 4, 1892	

## SOUTH ATLANTIC SQUADRON—Continued.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
ESSEX—continued.			
Montevideo, Uruguay .....	Mar. 5, 1892	Mar. 12, 1892	
Ensenada, Argentine Republic ..	Mar. 13, 1892	Mar. 26, 1892	
Montevideo, Uruguay .....	Mar. 27, 1892	May 30, 1892	
Maldonado, Uruguay .....	June 2, 1892	June 15, 1892	
Montevideo, Uruguay .....	June 15, 1892		
Yantic, Lieut. Commander SAMUEL BELDEN, U. S. N., commanding.			
Norfolk, Va. ....	Oct. 13, 1891	Oct. 26, 1891	Under orders to join South Atlantic station.
Porto Grande, Cape Verde Islands.	Nov. 20, 1891	Nov. 30, 1891	
Montevideo, Uruguay .....	Jan. 2, 1892	Jan. 6, 1892	
Buenos Ayres, Argentine Republic.	Jan. 8, 1892	Mar. 3, 1892	
Montevideo, Uruguay .....	Mar. 4, 1892	Mar. 12, 1892	
Maldonado, Uruguay .....	Mar. 12, 1892	Mar. 28, 1892	
Montevideo, Uruguay .....	Mar. 28, 1892	May 6, 1892	
Colonia, Uruguay .....	May 7, 1892	June 1, 1892	
Rosario, Argentine Republic .....	June 5, 1892	June 28, 1892	
Nueva Palmira, Uruguay .....	June 30, 1892		
Bennington, Commander R. B. BRADFORD, U. S. N., commanding.			
New York navy-yard .....	Aug. 26, 1891	Nov. 19, 1891	At New York, last report.
Hampton Roads, Va. ....	Nov. 20, 1891	Nov. 22, 1891	
Yorktown, Va. ....	Nov. 22, 1891	Dec. 1, 1891	
Norfolk, Va., navy-yard .....	Dec. 1, 1891	Dec. 7, 1891	
Hampton Roads, Va. ....	Dec. 7, 1891	Dec. 9, 1891	
St. Thomas, W. I. ....	Dec. 15, 1891	Dec. 16, 1891	
Port Castries, St. Lucia, W. I. ....	Dec. 18, 1891	Dec. 21, 1891	
Bridgetown, Barbados, W. I. ....	Dec. 22, 1891	Dec. 23, 1891	
Bahia, Brazil .....	Jan. 4, 1892	Jan. 5, 1892	
Montevideo, Uruguay .....	Jan. 12, 1892	Feb. 11, 1892	
English Bank, La Plata River ..	Feb. 11, 1892	Feb. 15, 1892	
Maldonado, Uruguay .....	Feb. 20, 1892	Feb. 29, 1892	
Montevideo, Uruguay .....	Feb. 29, 1892	Mar. 8, 1892	
Ensenada, Argentine Republic ..	Mar. 9, 1892	Mar. 26, 1892	
Montevideo, Uruguay .....	Mar. 27, 1892	Apr. 14, 1892	
English Bank, La Plata River ..	Apr. 14, 1892	Apr. 18, 1892	
Maldonado, Uruguay .....	Apr. 18, 1892	Apr. 27, 1892	On May 5, 1892, transferred from the Squadron of Evolution to the South Atlantic Squadron.
Montevideo, Uruguay .....	Apr. 27, 1892	June 2, 1892	
Chico Bank Light Ship .....	June 2, 1892	June 8, 1892	
Colonia, Uruguay .....	June 3, 1892	June 22, 1892	
Buenos Ayres, Argentine Republic.	June 22, 1892		
Montevideo .....		July 10, 1892	
Bahia .....		July 19, 1892	
St. Vincent .....		July 28, 1892	
Palos .....			
Cadiz .....	Aug. 8, 1892		Columbus celebration. Do.
Genoa .....	Sept. 2, 1892	Sept. 13, 1892	
Barcelona .....		Sept. 30, 1892	
Huelva .....	Oct. 7, 1892		Towing caravels.
Cadiz .....	Oct. 16, 1892		
Tallapoosa, Commander JAMES M. FORSYTH, U. S. N., commanding.			
Moored in No. 2 dock, Buenos Ayres, Argentine Republic.	May 22, 1891		Unfit for further service. Ship condemned and to be offered for sale Jan. 30, 1892. Ship sold at public auction Mar. 2, 1892. Officers and crew sent to the United States by merchant vessels.

## APPRENTICE TRAINING SHIPS.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
<b>Monongahela, Capt. J. H. SANDS, U. S. N., commanding.</b>			
Port Mahon, Minorca .....	Oct. 12, 1891	Nov. 8, 1891	Port Mahon, last report. Practice cruise for instruction of naval apprentices.
Ville Franche (sur-mer), France	Nov. 12, 1891	Nov. 21, 1891	
Gibraltar Bay (off Algieras) .....	Dec. 5, 1891	Dec. 6, 1891	
Bridgetown, Barbados .....	Jan. 3, 1892	Jan. 23, 1892	
Port of Spain, Trinidad .....	Jan. 28, 1892	Feb. 1, 1892	
Do .....	Feb. 6, 1892	Feb. 17, 1892	
La Brea, Trinidad .....	Feb. 18, 1892	Feb. 19, 1892	
San Fernando, Trinidad .....	Feb. 19, 1892	Feb. 22, 1892	
Port of Spain, Trinidad .....	Feb. 27, 1892	Mar. 14, 1892	
Bridgetown, Barbados .....	Mar. 21, 1892	Mar. 29, 1892	
St. Christopher, W. I. ....	Apr. 1, 1892	Apr. 7, 1892	
St. Thomas, W. I. ....	Apr. 8, 1892	Apr. 18, 1892	
Hampton Roads, Va. ....	Apr. 28, 1892	May 3, 1892	
Navy-yard, Norfolk, Va. ....	May 3, 1892	May 24, 1892	
Sandy Hook, N. J. ....	May 26, 1892	May 27, 1892	
Portsmouth Harbor, N. H. ....	May 29, 1892	June 1, 1892	
Navy-yard, Portsmouth, N. H. ....	June 1, 1892		
Newport, R. I. ....	Oct. 23, 1892		Undergoing repairs and putting on new deck. Still at the navy-yard, Sept. 30.
<b>Portsmouth, Commander C. D. SIGSBEE, U. S. N., commanding.</b> At sea from beginning of quarter to Newport.			
Newport, R. I. ....	Oct. 20, 1891	Nov. 18, 1891	At Newport, last report.
Fortress Monroe, Va. ....	Nov. 22, 1891	Nov. 24, 1891	
Norfolk, Va. ....	Nov. 24, 1891	Feb. 4, 1892	
Lynn Haven, Florida, Va. ....	Feb. 4, 1892	Feb. 8, 1892	
Bridgetown, Barbados .....	Feb. 26, 1892	Mar. 5, 1892	Practice cruise for instruction of naval apprentices.
Port of Spain, Trinidad .....	Mar. 6, 1892	Mar. 8, 1892	
Gulf of Paria .....	Mar. 8, 1892	Mar. 23, 1892	
Port of Spain, Trinidad .....	Mar. 23, 1892	Apr. 6, 1892	
St. Thomas, Danish West Indies .....	Apr. 11, 1892	Apr. 19, 1891	
Fortress Monroe, Va. ....	Apr. 28, 1892	May 29, 1892	
Newport, R. I. ....	June 1, 1892	July 2, 1892	
Plymouth, England .....	Aug. 6, 1892	Aug. 20, 1892	Summer cruise to Europe, for instruction of apprentices.
Funchal, Madeira .....	Sept. 1, 1892	Sept. 5, 1892	
Newport, R. I. ....	Oct. 7, 1892	Oct. 15, 1892	
New York, Yard .....	Oct. 7, 1892		
<b>Jamestown, Commander C. F. GOODRICH, U. S. N., commanding.</b>			
Hampton Roads, Va. ....	Oct. 18, 1891	Oct. 22, 1891	At Hampton Roads, last report.
New York, N. Y. ....	Oct. 26, 1891	Nov. 8, 1891	
New London, Conn. ....	Nov. 10, 1891	Nov. 11, 1891	
Newport, R. I. ....	Nov. 11, 1891	Nov. 27, 1891	
Hampton Roads, Va. ....	Dec. 1, 1891	Dec. 8, 1891	
Norfolk, Va. ....	Dec. 8, 1891	Feb. 20, 1892	
Hampton Roads, Va. ....	Feb. 20, 1892	Mar. 1, 1892	Practice cruise for the instruction of naval apprentices.
Bridgetown, Barbados, West Indies.	Mar. 21, 1892	Apr. 4, 1892	
Kingstown, St. Vincent .....	Apr. 5, 1892	Apr. 9, 1892	
Port Castries Harbor, St. Lucia .....	Apr. 10, 1892	Apr. 14, 1892	
St. Pierre, Martinique .....	Apr. 15, 1892	Apr. 22, 1892	
Basse Terre, St. Christopher .....	Apr. 24, 1892	Apr. 27, 1892	
Santa Cruz, West Indies .....	Apr. 28, 1892	May 2, 1892	
St. Thomas, West Indies .....	May 2, 1892	May 7, 1892	
New York, N. Y. ....	May 24, 1892	June 11, 1892	
Newport, R. I. ....	June 12, 1892	June 18, 1892	
Smithtown Bay, L. I. ....	June 19, 1892	June 21, 1892	
Saybrook, Conn. ....	June 21, 1892	June 22, 1892	
New London, Conn. ....	June 22, 1892	Aug. 17, 1892	
Stony Brook, L. I. ....	Aug. 20, 1892	Aug. 22, 1892	
New York, lower Bay .....	Aug. 23, 1892	Aug. 25, 1892	
Hampton Roads, Va. ....	Aug. 26, 1892	Aug. 29, 1892	
Norfolk, Va. ....	Aug. 29, 1892		Put out of commission Sept. 6, 1892. Prepared to be transferred to the Marine Hospital Service at Norfolk, Va. Transferred Sept. 9, 1892.

## SHIPS EMPLOYED ON SPECIAL DUTY.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
<b>Dolphin</b> , Commander W. H. BROWNSON, U. S. N., commanding.			
Norfolk, Va. ....		Mar. 23, 1892	Put in commission March 14, 1892.
Washington, D. C. ....	Mar. 24, 1892	May 2, 1892	
Norfolk, Va. ....	May 3, 1892	May 24, 1892	
Fortress Monroe, Va. ....	May 24, 1892	May 27, 1892	
Annapolis, Md. ....	May 27, 1892	June 4, 1892	
Washington, D. C. ....	June 5, 1892	June 29, 1892	
New York, N. Y. ....	July 1, 1892	July 2, 1892	On July 4 landed sailors and took part in celebration at Cape May City, N. J.
Cape May City, N. J. ....	July 3, 1892	July 5, 1892	
New York, N. Y. ....	July 5, 1892	July 20, 1892	
Gravesend Bay, N. Y. ....	July 20, 1892	July 21, 1892	
Peekskill, N. Y. ....	July 21, 1892	July 22, 1892	
New York, N. Y. ....	July 22, 1892	July 28, 1892	
New London, Conn. ....	July 28, 1892	Aug. 11, 1892	
Bar Harbor, Me. ....	Aug. 12, 1892	Aug. 28, 1892	
New London, Conn. ....	Aug. 29, 1892	Sept. 2, 1892	
Newport, R. I. ....	Sept. 2, 1892	Sept. 3, 1892	
New London, Conn. ....	Sept. 3, 1892	Sept. 5, 1892	
New York, N. Y. ....	Sept. 6, 1892	Sept. 12, 1892	
Baltimore, Md. ....	Sept. 14, 1892	Sept. 17, 1892	Naval veterans' annual encampment.
Washington, D. C. ....	Sept. 18, 1892	Sept. 25, 1892	
Norfolk, Va. ....	Sept. 26, 1892	Sept. 27, 1892	
New York, N. Y. ....	Sept. 28, 1892	.....	Naval parade, October 12, 1892.
<b>Thetis</b> , Commander GEORGE C. REITER, U. S. N., commanding.			
Unalaska, Alaska. ....	Sept. 25, 1891	Oct. 7, 1891	Cruising in Bering Sea on duty in connection with the seal fisheries.
San Francisco, Cal. ....	Oct. 20, 1891	Oct. 22, 1891	
Navy-yard, Mare Island, Cal. ....	Oct. 22, 1891	Dec. 15, 1891	
San Francisco, Cal. ....	Dec. 15, 1891	Jan. 5, 1892	
San Diego, Cal. ....	Jan. 8, 1892	Jan. 11, 1892	
Do. ....	Mar. 13, 1892	Mar. 14, 1892	
San Francisco, Cal. ....	Mar. 17, 1892	Mar. 18, 1892	
Navy-yard, Mare Island, Cal. ....	Mar. 18, 1892	Apr. 13, 1892	
San Francisco, Cal. ....	Apr. 13, 1892	Apr. 18, 1892	
Hilo, Hawaiian Islands. ....	May 13, 1892	May 14, 1892	
Do. ....	May 14, 1892	May 16, 1892	
Honolulu, Hawaiian Islands. ....	May 20, 1892	June 5, 1892	
San Francisco, Cal. ....	June 18, 1892	June 20, 1892	Undergoing repairs.
Mare Island, Cal. ....	June 20, 1892	.....	
<b>Michigan</b> , Commander GEORGE E. WINGATE, U. S. N., commanding.			
Erie, Pa. ....	Oct. 29, 1891		At Erie last report.
Chicago, Ill. ....		Oct. 29, 1891	
Harbor Springs, Mich. ....	Oct. 11, 1891	Oct. 12, 1891	
McLeod Bay, Mich. ....	Oct. 12, 1891	Oct. 13, 1891	
Middle Island, Mich. ....	Oct. 13, 1891	Oct. 14, 1891	
Sand Beach, Mich. ....	Oct. 14, 1891	Oct. 15, 1891	
Algonac, Mich. ....	Oct. 15, 1891	Oct. 16, 1891	
Detroit, Mich. ....	Oct. 16, 1891	Oct. 22, 1891	
Put-in Bay, Ohio. ....	Oct. 22, 1891	Oct. 23, 1891	
Cleveland, Ohio. ....	Oct. 23, 1891	Oct. 28, 1891	
Erie, Pa. ....	Oct. 29, 1891	May 25, 1892	Went into winter quarters Nov. 20, 1891.
Detroit, Mich. ....	May 26, 1892	May 27, 1892	
Chicago, Ill. ....	May 30, 1892	Aug. 27, 1892	Engaged in surveying the water front of the City of Chicago.
Milwaukee, Wis. ....	Aug. 27, 1892	Aug. 31, 1892	
Mackinac Island, Mich. ....	Sept. 1, 1892	Sept. 5, 1892	
Limo Island, St. Marys River. ....	Sept. 5, 1892	Sept. 6, 1892	
Sault Ste. Marie, Mich. ....	Sept. 6, 1892	Sept. 7, 1892	
Fort Huron, Mich. ....	Sept. 8, 1892	Sept. 9, 1892	
Detroit, Mich. ....	Sept. 9, 1892	Sept. 14, 1892	
Erie, Pa. ....	Sept. 15, 1892	Oct. 1, 1892	
Cleveland. ....	Oct. 2, 1892	Oct. 5, 1892	
Detroit. ....	Oct. 6, 1892	Oct. 9, 1892	Took part in the ceremonies attending the opening of the World's Columbian Exposition.
Chicago. ....	Oct. 12, 1892	.....	

## SHIPS EMPLOYED ON SPECIAL DUTY—Continued.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
<b>Constellation</b> , Commander C. M. CHESTER, U. S. N., commanding. Relieved by Commander C. F. GOODRICH, U. S. N., September 6, 1892.			
Annapolis, Md. ....		June 7, 1892	Put in commission May 14, 1892. Sailed on practice cruise with naval cadets.
Fortress Monroe, Va. ....	June 10, 1892	June 14, 1892	
New London, Conn. ....	June 18, 1892		
Newport, R. I. ....	July 4, 1892		
Annapolis, Md. ....	Aug. 25, 1892	Aug. 27, 1892	Cadets returned to Naval Academy, August 26, 1892. Being prepared to go to Europe to transport works of art for the World's Columbian Exposition.
Norfolk Navy-yard. ....	Aug. 30, 1892	Oct. 6, 1892	Sailed for Naples, Italy, Oct. 6. Engaged in carrying freight between the different navy-yards and stations.
<b>Fern</b> , Lieut. Commander A. J. IVERSON, U. S. N., commanding. Relieved on March 23, 1892, by Lieut. Commander W. C. GIBSON.			
<b>Enterprise</b> , Commander C. M. CHESTER, U. S. N., commanding.			
Annapolis, Md. ....	Sept. 17, 1891	Sept. 2, 1892	At Annapolis, last report.
Norfolk, Va. ....	Sept. 3, 1892	Sept. 9, 1892	This vessel is now being used as a cadet training and practice ship at the Naval Academy.
Boston, Mass. ....	Sept. 13, 1892		Sent to Boston, Mass., to be prepared to be turned over to the State of Massachusetts for use as a school ship. On October 17, 1892, turned over to the State of Massachusetts.
<b>Plata</b> , Lieut. Commander W. MAYNARD, U. S. N., commanding.			
Sitka, Alaska. ....	Sept. 4, 1891	Sept. 30, 1891	At Sitka, last report.
Yakutat, Alaska. ....	Oct. 1, 1891	Oct. 8, 1891	Cruising in Bering Sea on duty in connection with seal fisheries.
Sitka, Alaska. ....	Oct. 9, 1891		
Schulze Cove, Alaska. ....	Jan. 30, 1892	Feb. 1, 1892	
Off Lituya Bay, Alaska. ....	Feb. 5, 1892	Feb. 5, 1892	
Sitka, Alaska. ....	Feb. 6, 1892	May 5, 1892	
Deep Bay, Alaska. ....	May 5, 1892	May 6, 1892	
Killisnoo, Alaska. ....	May 6, 1892	May 10, 1892	
Shakan, Alaska. ....	May 11, 1892	May 14, 1892	
Port Beaulieu, Alaska. ....	May 14, 1892	do	
Wrangell, Alaska. ....	do	May 17, 1892	
Highfield Anchorage. ....	May 17, 1892	May 18, 1892	
Wrangell, Alaska. ....	May 18, 1892	do	
Steamer Bay, Alaska. ....	do	May 19, 1892	
Ward Cove, Alaska. ....	May 19, 1892	May 21, 1892	
Port Chester, Alaska. ....	May 21, 1892	May 23, 1892	
Karta Bay, Alaska. ....	May 23, 1892	May 24, 1892	
Ward Cove, Alaska. ....	May 24, 1892	May 25, 1892	
Port Chester, Alaska. ....	May 25, 1892	May 26, 1892	
Kitchikan post-office. ....	May 26, 1892	do	
Loring, Alaska. ....	May 26, 1892	May 27, 1892	
Steamer Bay, Alaska. ....	May 27, 1892	May 28, 1892	
Security Bay, Alaska. ....	May 29, 1892	May 30, 1892	
Schulze Cove, Alaska. ....	May 30, 1892	May 31, 1892	
Sitka Harbor, Alaska. ....	May 31, 1892	June 30, 1892	
Deep Bay, Alaska. ....	June 30, 1892	July 2, 1892	
<b>Albatross</b> , Lieut. Commander Z. L. TANNER, U. S. N., commanding.			
Navy-yard, Mare Island, Cal. ....		Oct. 5, 1891	Transferred temporarily by the United States Commissioner of Fish and Fisheries to the Navy Department, for the purpose of making an ocean survey for a telegraphic cable between San Francisco and Honolulu, as provided by the act of Congress approved March 3, 1891.

## SHIPS EMPLOYED ON SPECIAL DUTY—continued.

Name of vessel and ports visited.	Date of arrival.	Date of departure.	Remarks.
<b>ALBATROSS—continued.</b>			
Navy-yard, Mare Island, Cal. ....	Oct. 10, 1891	Oct. 31, 1891	
San Francisco, Cal. ....	Oct. 31, 1891	Nov. 4, 1891	
Honolulu, H. I. ....	Nov. 21, 1891	Dec. 11, 1891	
San Francisco, Cal. ....	Dec. 31, 1891	Jan. 6, 1892	
Mare Island, navy-yard, Cal. ....	Jan. 16, 1892	Mar. 19, 1892	Ran a line of soundings between San Francisco and Honolulu. On Mar. 16, 1892, was transferred to the U. S. Commission of Fish and Fisheries.
<b>GUSHING, torpedo boat, Lieut. C. McK. WINSLOW, U. S. N., commanding.</b>			
Newport, R. I. ....	Sept. 8, 1891	Jan. 16, 1892	At Newport last report. Sept. 15, 1891, detached from Squadron of Evolutions and attached to Torpedo Station. Put out of commission Nov. 11, 1891. Put into commission Jan. 11, 1892.
New York navy-yard	Jan. 17, 1892	Mar. 31, 1892	
Hampton Roads, Va. ....	Apr. 2, 1892	Apr. 2, 1892	
Navy-yard, Washington, D. C. ....	do	July 11, 1892	Hauled out of water and overhauled. Made preparations for putting in torpedo tubes. Fitted rapid-fire gun mounts.
Hampton Roads, Va. ....	July 11, 1892	July 12, 1892	
Navy-yard, New York. ....	July 14, 1892	Aug. 17, 1892	Fitting torpedo tubes and Whitehead torpedoes.
Newport, R. I. ....	Aug. 17, 1892	Sept. 15, 1892	
Greenport, L. I. ....	Sept. 16, 1892		Experimenting with Whitehead torpedoes.
New York, N. Y. ....			Took part in naval parade Oct. 12.
Sag Harbor, N. Y. ....	Oct. 18, 1892		Experimenting with Whitehead torpedoes.



## B.

### REPORT OF THE SUPERINTENDENT, NAVAL ACADEMY.

U. S. NAVAL ACADEMY,  
*Annapolis, Md., Oct. 4, 1892.*

SIR: I have the honor to submit a report of the operations of the U. S. Naval Academy during the past academic year.

At the annual examination in June, 1892, 34 naval cadets of the line division and 6 of the engineer division completed the four years' course at the Academy and received certificates of proficiency. Of the latter, one, having been found physically disqualified for the naval service, has resigned.

At the same examination 28 naval cadets of the line division and 3 of the engineer division having completed their six years' service as naval cadets were examined for final graduation. All passed the professional examination and received certificates of graduation.

Two were honorably discharged at their own request and the others were assigned as follows:

To the line of the Navy.....	20
To the Engineer Corps of the Navy.....	3
To the Marine Corps.....	6

At the commencement of the present academic year, October 1, 1892, the numbers in several classes were:

First class, line division.....	41
First class, engineer division.....	6
Second class.....	59
Third class.....	60
Fourth class.....	75
Total.....	241

The following changes in the vessels attached to the Academy have occurred during the year:

The *Passaic*, *Enterprise*, and *Constellation* were, by direction of the Department, sent to the navy-yard at Norfolk, Va., respectively, on January 14, August 26, and September 2, 1892.

The prescribed programme of studies has been followed, and the programme of drills and exercises has been departed from only when made necessary by conditions of weather.

The new houses built for officers' quarters have been finished and are now occupied.

Work on grading the new grounds will be continued during the months of October and November, when the appropriation for that purpose will probably be exhausted.

Particular attention has been paid to systematizing the branch of physical training, the object in view being the best symmetrical physical development of every cadet.

Each one is carefully measured, and his strength of lift, squeeze, pull, etc., noted, after which the exercise necessary for the development

of any point in which he is lacking will be directed. It is intended that the above examination shall be made and the prescribed exercises modified with sufficient frequency to insure as rapid development as each one is capable of, and to guard against one part of the body being overdeveloped at the expense of other parts.

It is urgently recommended that power be given by statute to the Superintendent of the Naval Academy to order courts of inquiry for the investigation of serious offenses committed by naval cadets. It has been found difficult to establish the guilt of those who commit the two gravest offenses—hazing and gonging—and failure to detect and bring to punishment offenders of this class has an injurious effect upon the discipline of the Academy.

It is believed that the cadets who commit these acts are encouraged to do so by the difficulties in the way of detection, which difficulties would be removed if formal sworn testimony could be taken. The enactment of such a statute would in itself so greatly tend to breaking up these practices, that the necessity for the exercise by the Superintendent of the power conferred upon him would not be of frequent occurrence.

It is also recommended that the limits of age of admission be fixed at from 14 to 18.

I inclose the report of the commanding officer of the practice ship *Constellation*, and invite the Bureau's attention to the excellent use that has been made of the time and to the satisfactory results attained.

Appended hereto is a statement showing the appropriation for the support of the Naval Academy for the fiscal year ending June 30, 1892.

Very respectfully, your obedient servant,

R. L. PHYTHIAN,

*Captain, U. S. Navy, Superintendent.*

The CHIEF OF BUREAU OF NAVIGATION,  
*Navy Department, Washington, D. C.*

*Statement of the Naval Academy appropriation for the fiscal year ending June 30, 1892.*

Headings of the appropriations.	Amounts appropriated.	Amounts expended to Sept. 30, 1892.	Unexpended balances to Sept. 30, 1892.	Liabilities for supplies purchased prior to June 30, 1892.	Balances.
Pay of professors and others .....	\$52,362.00	\$52,289.00	\$72.48		\$72.48
Special course .....	5,000.00	2,260.52	2,739.48	\$750.00	1,989.48
Pay of watchmen and others .....	44,086.95	44,085.02	1.93		1.93
Pay of employes, steam engineering department .....	7,824.50	7,824.35	.15		.15
Heating and lighting .....	17,000.00	16,841.20	158.80		158.80
Board of visitors .....	1,500.00	1,023.48	476.52		476.52
Intelligent .....	40,300.00	38,155.36	2,144.64	2,097.21	47.43
Salaries .....	21,000.00	18,603.86	2,396.14	2,327.45	68.69
Entertainment for gymnasium .....	5,000.00	4,253.84	746.16	522.25	223.91
<b>Total .....</b>	<b>194,073.45</b>	<b>85,337.15</b>	<b>8,736.30</b>	<b>5,696.91</b>	<b>3,039.39</b>

## C.

## REPORT OF THE COMMANDANT OF THE NAVAL TRAINING STATION.

COMMANDANT'S OFFICE,  
U. S. NAVAL TRAINING STATION,  
Newport, R. I., July 1, 1892.

SIR: During the year ending June 30, 1892, there have been received at this Station 789 apprentices—

Enlisted at station, <i>Richmond</i> .....	27
Enlisted at New York, <i>Minnesota</i> .....	487
Enlisted at Philadelphia, <i>St. Louis</i> .....	70
Enlisted at Washington, <i>Dale</i> .....	68
Enlisted at Erie, <i>Michigan</i> .....	87
Enlisted at Boston, <i>Wabash</i> .....	43
Enlisted at New London, <i>New Hampshire</i> .....	2
Received from desertion.....	4
Received by transfer.....	1
Total.....	789

The following apprentices have been transferred from the station:

To <i>Jamestown</i> .....	196
To <i>Portsmouth</i> .....	245
To <i>Wabash</i> , hospital.....	5
To <i>Despatch</i> .....	1
To <i>Boston</i> .....	1
To <i>Miantonomoh</i> .....	1
To <i>Minnesota</i> .....	1
Total.....	450

The following apprentices have been discharged from the service for—

Inaptitude.....	47
Physical disability.....	8
Request of parents or guardians.....	9
Illegal enlistment.....	7
Total.....	71

During the year there have been 30 desertions.

## RECAPITULATION.

At Station June 30, 1891.....	9
Received to July 1, 1892.....	789
Transferred.....	450
Discharged.....	71
Deserted.....	30
At station June 30, 1892.....	247

The training of the apprentices at the Station has been conducted in strict compliance with the system described in my letter, No. 807, of October 23, 1891, and the routines forwarded therewith, approved by the Bureau.

It was impossible to completely apply this system until a division of six sections, each of 18 apprentices, had been formed after the sailing of the cruising training ships for their winter's cruise. The first division, filled and dated from December 17, 1891, in charge of Ensign Guy W. Brown, was transferred to the *Portsmouth* June 15, 1892. The second division, Ensign H. H. Whittlesey, filled and dated from February 25, 1892, was broken up, 65 of its apprentices

ng transferred to the *Jamestown* June 15, 1892; the remainder, 26, here, together with the third division. Lieut. G. R. Clark, filled dating from April 29, 1892, and the fourth division, Lieut. A. D. Wood, filled and dating from June 17, 1892. A new first division is now forming and will take date when filled.

The work of training the apprentices has been conducted with the greatest zeal and intelligence by the officers of the division, and with such success as to make certain that the changes introduced in the system of training have been beneficial. The objects sought have been attained, responsibility is fixed, an accurate knowledge of each apprentice is obtained, and the bad material of each division can be removed before mischief is done. Emulation in drills, exercises, and even conduct has arisen between divisions, benefiting all. Instruction has been confined to squad and division exercises. No individual instruction has been given and there have been no dress parades or other general exercises attempted. Yet when required, as on Decoration Day and at the parade at the inauguration of the governor of Rhode Island, the senior divisions have been able to most creditably take part in processions and parades, in testimony of which I forward to you a letter from the governor.

Coming to the station at uncertain intervals and in uncertain numbers during every month of the year, the divisional system collects a certain number, 108 apprentices, and keeps them together under the same officers and instructors throughout their training. Every exertion is made to have this instruction and training thorough, never losing sight of its object to fit the apprentice for the service, to make a man-of-war's man of him, and to get the average standing of the division as high as possible in every branch. Boxing has been dropped. Gymnastics, the Roberts's system, has been daily taught and practiced by all. Measurements taken of the boys on their reception here and repeated quarterly by the surgeons prove the great benefit resulting from this change. The surgeon reports the result of third measurements to be an average change, as follows:

Period of time six months: Girth of neck,  $\frac{1}{2}$  of an inch increase; girth of chest,  $1\frac{1}{2}$  inches increase; chest expansion,  $\frac{1}{2}$  inch increase; lung capacity, 15 cubic inches increase; waist, no change; hips,  $\frac{3}{4}$  of an inch increase; shoulders,  $\frac{1}{2}$  of an inch increase; arms,  $\frac{3}{4}$  of an inch increase; legs,  $\frac{1}{4}$  of an inch increase; and that the difference observed between the first and second measurements is greater than between the second and third. The body responds favorably and rapidly to the new conditions under which the boy is living and to which he has suddenly come, the tone of the physique is changed for the better, the skin has gained color and firmness, and there is an evident change in quality of texture both of skin and muscle. The discipline has steadily improved. Seventy-seven per centum of the apprentices have received no more severe punishment than demerits.

The following is a monthly statement of the number of reports received by the first division from date of filling of division, December 11, 1891, to date of transfer, June 15, 1892:

er 17, 1891, to January 17, 1892	507
17, 1892, to February 17, 1892	475
17, 1892, to March 17, 1892	277
17, 1892, to April 17, 1892	221
17, 1892, to May 17, 1892	488
17, 1892, to June 15, 1892	110

Monthly statement of the number of reports received by the sec-

ond division from date of filling of division, February 25, 1892, to date of transfer, June 15, 1892, is as follows:

February 25, 1892, to March 25, 1892 .....	384
March 25, 1892, to April 25, 1892 .....	128
April 25, 1892, to May 25, 1892 .....	105
May 25, 1892, to June 15, 1892 .....	98

During the year there have been 30 desertions out of 798 apprentices, against 81 out of 713 during the year 1890, as shown by the last annual report on file at this office.

The change in manner of instruction necessitated a change in instructors. Qualified seamen gunners from the service have replaced special instructors in all branches of training, except singing, bugle-playing, and studies.

The average of the first division, filled December 17, 1891, determined by the examination, June 1, 1892, maximum 5, was in seamanship, 2.9; gunnery, 3.0; marksmanship, 2.9 (small arms).

Seamanship includes knotting and splicing, boats, signals, lead and log lines, heaving lead, compass, work with sails and light spars, sail-making, rigging, all standing, and the running on the mizzen of *Richmond*, knowledge of ship; gunnery, everything pertaining to the IX-inch smooth-bore gun, 3-inch B. L. R., 37 m.m. H. R. C., and the Gatling, magazines and shell rooms on *Richmond*, infantry and artillery drills and broadsword, marksmanship, skill in use of Lee rifle and revolver at range.

The average of the second division, filled February 25, 1892, determined by the examination of June 1, 1892, maximum 5, was in seamanship, 2.5; gunnery, 2.5; marksmanship, 2.7 (small arms).

It is essential that a training to fit apprentices for the service shall be kept in close touch and communion with it; that instructors, as far as possible, shall be drawn from and returned to the general service. Qualified seamen gunners ought to be able to teach apprentices all that is necessary or desirable in their general training as man-of-war's men—seamanship, gunnery, and drills and exercises in the use of the arms of every kind of the Navy. This is work of a most responsible character, and the rating of "schoolmaster" given these men does not at all define their duties, for, in addition to that of instruction, they inspect clothing and person, and keep watch over the apprentices at all times of the day from 5:30 a. m. to 9 p. m. (one sleeping with the division), and under the officers of divisions they carry out the prescribed routine, preserve discipline, and prevent disorder; on their efficiency largely depends the usefulness of this station. Apprentices from their reception here are kept under close observation at all times day or night, live under supervision in order that bad habits may be eradicated and good habits, from the routine requirements, may take their place. Apprentices after living a few months in this way conform to routine and regulations readily, and on their transfer to the station-ship for ship instruction, where, as on board any ship, it is impossible to closely supervise any considerable number of them, the formed habit largely governs, their conduct is good, and their attention to and interest in their work marked.

The present allowance of schoolmasters is 12; of these, 4—the bugle, singing, studies, and target-firing masters—are general, the 8 remaining divisional. One of the 8 is, however, always in charge of the "new-comers'" squad, taking divisional duty only when a fourth division is filled up at the station. This is not a large enough force for the work. The duty is constant every day of the year, and the hours of duty are

on each day. The only similar duty is that of a company or battery of the Army. From Army Register, 1892, I find a company of infantry to consist of: 1 captain, 1 first lieutenant, 1 second lieutenant, 1 first sergeant, 4 sergeants, 4 corporals, 1 wagoner, 2 artificers, 2 musicians, 46 privates; total, 63. Three commissioned officers with 9 noncommissioned in a total of 63. A battery of artillery is the same in all respects, with the exception of an additional first lieutenant, 4 commissioned officers, and 9 noncommissioned in a total of 64 persons.

I therefore propose and recommend for this station the following divisional organization: One commissioned officer, lieutenant (junior grade) or ensign; one warrant officer, boatswain or gunner; three masters-at-arms; three schoolmasters; one hundred and eight apprentices (six sections)—one commissioned, one warrant, and sixty petty officers in a total of 116 persons, and that the general duty petty officers be one master-at-arms, three schoolmasters, the master-at-arms to have charge of the target range and firing parties using it; the schoolmasters to instruct—one in bugle, one in singing, one in studies—with charge of library. There can be no better school for petty officers for general service than that offered by this plan. In charge of these sections of apprentices, they are constantly in the control of others, and constantly under the observation of their superiors.

The seaman gunner during the first year should have the rating of schoolmaster, and during his second year that of master-of-arms, provided he merits the promotion. An accurate record and report of the qualifications of each of the seamen gunners detailed for duty here should be kept and noted on his "enlistment record" on his transfer to the general service.

The service will gain in this way from this station trained petty officers whose trustworthiness can be relied upon, and they would acquire qualifications now so difficult to find among them—ability to and spirit of command.

A series of readings, illustrated by stereopticon pictures, has been prepared by the chaplain, five papers, a man-of-war "Series," starting with a description of the first war vessel known, and ending with that of the war vessel of to-day. These readings are entitled: (1) "Days of Oars." (2) "Days of Sails." (3) "Sails plus steam; Wood plus Iron." (4) "New Navy." (5) "Guns, Armor, and Torpedoes."

These have greatly interested and instructed the apprentices. Blue prints have been obtained of the new vessels from the Bureau of Construction and Repair, and battened to the walls of the drill hall. They have literally been studied to tatters, and were for weeks surrounded during recreation hours by groups of boys.

I have to request to be furnished with pictures and drawings of our vessels, with blue prints of their plans, arrangement of batteries, etc., for decoration of the drill hall and purposes of instruction. I am desirous of securing a series of papers, "Naval Incidents," giving a spirited account of those of our service, exclusive of any in which living officers are mentioned; and a series, "Cruises," coast of England, France, China, and now they are reached, and what is seen when there; in the "how they are reached" to teach the leading facts of physical geography of the countries, and in the "what is seen there" those of the descriptive geography of the countries, objects of interest seen, etc. These papers to be read in the evenings.

Teaching apprentices is best done by the repetition of facts until facility in using them is acquired, and in the repetition of facts until they are fixed on the memory.

A form of divine service has been arranged in which this principle of the value of repetition is retained. The service is part of that of the Episcopal prayer book. It lasts forty-five minutes, and there have been twelve hymns selected and set to good music, national airs largely; five of these are sung as a part of each service. Singing is taught as per routine, and twelve good songs are selected for repetition at the lessons. The object in view is to force every apprentice to carry from the station with him a knowledge of these at least, to which he can afterwards add what he pleases.

The fencing master was discharged. Broadsword exercise is taught by the divisional officers with complete success. A very much larger proportion of the apprentices become fair swordsmen than under the old system; one man can not teach fencing to several hundred boys in six months.

There are three eras in apprentice life—leaving home, going on board ship, going to sea. Landsmen put on board a man-of-war and sent to sea are overwhelmed by the novelty of their surroundings. There is so much to be learned, the daily routine of life, with its necessary apparatus, bag, hammock, and mess; the exercises with boats, spars, and sails; with the batteries; with the rifle, pistol, and sword, the use of the oar, sail, compass, log, lead, the ship itself.

To take a boy of from 14 to 17 from home and put him in this position stupefies him, and is a cruelty. Months elapse before his nervous forces recover from the shock and he is in a fit condition to be trained for the service, physically or mentally. Hence the use of this station and of the system devised as an essential means of training.

Here the apprentice is first taught the proper care of his person, clothing, and bedding; then the exercises and drills of the smaller arms, acquiring the habits of obedience and discipline in the teaching, always under supervision, and forming a part of a squad or section. He loses bad habits, and his ambition and his emulation are excited. He is ashamed to be more ignorant than his immediate companions, first of squad, then of the section, and last of the division. Always under the same instructors, his character and abilities are soon known, and he knows it. Excuses of ignorance, want of time, or of instruction are useless. He feels that he must keep up with his fellows, and he does it; and his progress is rapid. He soon acquires self-respect; is never scolded or touched personally, but punished surely for willful idleness or negligence. He takes pride in his own advancement, and needs less and less correction or punishment. He goes on board ship five or six months after his arrival, eager to learn, and he does learn, and is as eager to get to sea to show that he has learned to prove himself. Then comes his transfer to a cruising training ship. At last he is at sea, and in a much shorter time than has been supposed necessary he becomes habituated to the sea and ready for transfer to the regular service, able to take care of himself, at home in drills and exercises, eager now to visit foreign countries and become a part of the Navy. This curiosity should not be forestalled. Satisfied curiosity has much to do with the desertion from cruising training ships on their return. A second cause is the too long detention of the lad from the general service after he feels himself qualified to discharge its duties. The man-of-war's man of to-day and of the future is not the man of thirty or less years ago any more than the conductor and engineer of a railway train is like the coachman and guard of the old stagecoach. We find the imitation of these to be the amusement of the rich, and something like old-fashioned man-of-war's men are found on board their yachts, and nowhere else.

need of the station is suitable quarters for officers, men, and apprentices, and proper appliances for the care and instruction of the crew. On my application I have been furnished by the Quartermaster-General of the Army with the plans of Fort Riley, Kans., a training station of the Army. The thorough and complete equipment there is in very strong contrast with an almost complete want of everything necessary here. I have forwarded to the Bureau plans of a building in which the essential needs are supplied, opportunity for complete supervision, abundant water supply, floor space for drills and exercises, mess, cooking, and sanitary arrangements. There remains to be provided quarters for officers, instructors, enlisted men, mechanics, etc., a hospital, and storehouse.

The *Portsmouth* sailed July 2, having on board the entire first division of this station. On her return, October next, this division of apprentices should be ready, if the system is followed, for leave and transfer to the general service at its expiration, about November 15, or eleven months from the date of the division, December 17, 1891. This is a month less than a year, and this division was on its transfer separated from its officers and instructors and mixed with some 50 apprentices then on board. I am, however, certain that from a quarter to a third of its members could have passed better examinations than those of any of the competitors for the Bailey medal, the winner of which, it must be remembered, had received no instruction or training other than that of the devised system. His competitors were picked boys, the best, one among 150, the other the best of 230 trained under the old system, and both much longer in the service and holding higher ratings.

Commander Sigsbee has taken the greatest interest in this training system, and I have no doubt that under him the training of this division will be progressive. I hope the division will be subjected to close examination on its return to learn what are the results of even a partial use of the new system.

Very respectfully,

F. M. BUNCE,

*Captain, U. S. Navy, Commandant.*

**THE CHIEF OF THE BUREAU OF NAVIGATION.**



D.

REPORT OF THE HYDROGRAPHER TO BUREAU OF NAVIGATION.

HYDROGRAPHIC OFFICE, BUREAU OF NAVIGATION,  
NAVY DEPARTMENT,  
Washington, October 1, 1892.

SIR: I have the honor to submit the following report of this office for the fiscal year ending June 30:

The details of this report will show that the past year has been one of advancement, particularly in the development of the capacity of the office for work by new machinery and new methods, which I have been enabled to promote by your approval.

THE HAWAIIAN CABLE SURVEY.

In pursuance of the act of March 2, 1891, to enable the President to cause careful soundings to be made between California and the Hawaiian Islands for the purpose of determining the practicability of the laying of a telegraph cable between those places, the use of the U. S. Fish Commission steamer *Albatross* was tendered to the Navy Department on September 13, 1891, to commence the work, there being no vessel of the Navy available for this purpose. After some necessary repairs and preparations at the Mare Island navy-yard, the first line of soundings was begun in Salinas Bay, California, on the 11th of October, and was continued along a great circle of the earth to Honolulu, Hawaiian Islands, which was reached on November 21, 1891. After examining suitable places for landing the shore end of the cable on the island of Oahu, a return line of soundings was begun on the 12th of December, 1891, and continued along a loxodromic curve to Salinas Bay, the origin of the first line, which was reached January 15, 1892. The *Albatross*, being required to make investigations in the Bering Sea, was detached from the cable survey in February, and the U. S. S. *Thetis* was detailed to complete the work, which consisted in running a line of soundings along a loxodromic curve from Point Concepcion, California, to Hilo Bay, Hawaiian Islands, between April 20 and May 18, 1892.

The plan of the survey consisted in developing the bottom of the ocean along a lane between California and the Hawaiian Islands by observations of the depth, the character of the bottom soil, the temperatures at the surface and the bottom of the ocean, and the vertical distribution of temperature throughout the whole depth; and in sounding the depths and developing the characteristics of the bottom of parts of the approaches to the coasts which are favorable for the landing of submarine cables, at Salinas Landing and Point Concepcion, California, and at Hanauma Bay, Mauna Loa Bay, Kapua Entrance, Waikiki, Honolulu, and Hilo Bay, Hawaiian Islands. Soundings were taken, in general, at alternate intervals of 10 and 2 miles; and at the geographic

position of each specimens of the bottom soil were obtained and the temperatures of the air and of the surface and bottom of the ocean were observed.

A report of the results of the survey accompanied by profiles and maps will be found in Senate Ex. Doc. 153, Fifty-second Congress, first session.

#### SURVEY OF THE COAST OF LOWER CALIFORNIA.

This work has been interrupted first by the *Thetis* being required in Bering Sea, and subsequently when she returned to her work on the coast of Lower California she was again diverted from this work to replace the *Albatross* in carrying on the survey for the Hawaiian cable route.

#### SURVEY OF THE CHICAGO WATER FRONT.

The survey of the Lake Front of the city of Chicago from Grosse Point to the Indiana State line was commenced on the 12th of June, 1892, and continued without interruption until August 12, by which time a length of shore line 27 miles in extent had been thoroughly surveyed. The inner hydrography was developed by soundings from 500 to 1,000 feet apart extending to a distance of 3 miles from shore. Beyond the 3-mile limit the deeper soundings out to a depth of 10 fathoms were taken by the ship along lines normal to the shore and about 1 mile apart.

#### BRANCH OFFICES.

The reports show the high state of efficiency maintained by the branches, and that they have satisfactorily supplied the wants of the sea-faring community, gathering and giving much valuable information, thereby very materially increasing the efficiency of the main office. The favorable criticism of individuals, shipping agents, and the press, and the resolutions of boards of trade, exchanges, etc., testify to the same.

**Boston.**—Lieut. W. H. Everett, U. S. Navy, has been in charge of the office during the past fiscal year. In September, 1891, the office was removed from the rotunda of the custom house to the basement, gaining more space and allowing the collection of charts, publications, in one room, thereby greatly facilitating the work.

**York.**—Lieut. O. W. Lowry, U. S. Navy, was in charge of this office from the beginning of the year up to April 8, 1892, when detached, Lieut. A. P. Nazro, U. S. Navy, who was formerly in charge, was ordered to relieve him. On June 26 Lieut. A. Marix, U. S. Navy, relieved Lieut. Nazro.

**Philadelphia.**—On June 24, 1892, Lieut. Commander Gheen, U. S. Navy, who had been in charge during most of the fiscal year, was relieved by Lieut. R. M. Hughes, U. S. Navy.

**San Francisco.**—Ensign G. R. French, U. S. Navy, was in charge of the office up to February 8, 1892, when he was relieved by Lieut. A. C. Smith, U. S. Navy.

**Time-ball** on top of the Baltimore and Ohio Railroad building is maintained by this office and is of great benefit.

**Washington.**—Lieut. Simon Cook, U. S. Navy, has been in charge of this office since October 17, 1891, when he relieved Lieut. A. L. Hall, U. S. Navy.

Navy, who was in charge after the detachment of Lieut. H. H. Barroll, U. S. Navy. The office lost the services of Mr. H. M. Lloyd, messenger, who died May 6, 1892.

Arrangements have been made to furnish the office with an electric clock connected with the Naval Observatory, which will in a measure supply the long felt want of a time-ball.

In view of the increase of commerce of Newport News, it is desirable to establish a suboffice, with telephonic connection with the Norfolk office.

*Savannah.*—Lieut. Francis H. Sherman, U. S. Navy, has been in charge of this branch during the fiscal year. The present quarters in the custom house are small and cramped, but in consequence of the very desirable location a change is not recommended.

Suboffices established at Charleston and Brunswick, each in charge of a clerk, but under the supervision of the officer in charge of this office, would be of great benefit to the commerce of those ports.

*New Orleans.*—Lieut. W. S. Hughes, U. S. Navy, in charge. The usefulness of this branch is constantly attested to by those interested in maritime affairs. The time-ball is dropped regularly, but should be removed to a more suitable location, so as to be more generally visible.

*San Francisco.*—Lieut. T. Dix Bolles, U. S. Navy, in charge. The office has continued its efforts to interest ship captains in the work of the Hydrographic Office, with very satisfactory results, as the increase in the number and quality of the reports received and forwarded show. The routine work of the office has been kept well up to date, and Hydrographic Office publication No. 58, "Navigation of the Pacific Ocean," has been revised, corrected, and prepared for the printer. Special bulletins have been published monthly, containing all late and important information, with trade-wind charts, sailing routes, cyclones, and other useful graphic data for the Pacific Ocean.

Messrs. Wightman Bros., who have a station on the Island of Taritari, one of the Marshall Islands, have permitted this branch to establish there a meteorological station in charge of their agent, Capt. Luttrell, the Hydrographic Office supplying wind and rain gauges, and dry and wet bulb thermometers; Messrs. Wightman furnishing barometers; observations to be taken at 8 a. m., noon, and 8 p. m. By combination of these reports with those from other stations established by several foreign nations, a good idea of Pacific meteorology can be obtained. The time service has been carried on with great satisfaction to merchants and mariners.

*Portland, Oregon.*—On February 11, 1892, Lieut. O. E. Lasher, U. S. Navy, relieved Lieut. David Peacock, U. S. Navy, who had been in charge from the beginning of the year.

The appropriation made by Congress the past session will enable the establishment the coming fiscal year of a branch office at Port Townsend, where one has been much needed.

Since the close of the fiscal year the San Francisco office has suffered the loss of its chief, Lieut. T. Dix Bolles, U. S. Navy, who died August 20, and the Boston office has lost L. M. Lee, who had faithfully served as assistant from the time of the establishment of the office. He died August 10.

## REPORTS RECEIVED AND FORWARDED TO MAIN OFFICE.

	Boston.	New York.	Philadelphia.	Baltimore.	Norfolk.	Savannah.	New Orleans.	San Francisco.	Portland, Oregon.
Greenwich noon observations....	753	3,103	920	347	38	130	222	446	50
Abstract of logs and meteorological journals.....	108	261	62			21	8	90	80
Miscellaneous reports on meteorologic and other phenomena, dangers to navigations, etc.....	4,480	3,478	2,378	495	42	352	65	556	413

## PUBLICATIONS, ETC., DISTRIBUTED.

Hydrographic bulletins.....	17,221	7,355	11,570	7,079	3,332	2,058	2,155	4,213	680
Pilot Charts and supplements.....	6,795	16,824	4,288	3,229	193	707	2,286	197	199
Hydrographic Office notices to mariners.....	259,250	198,400	97,615	17,170	8,855	8,735	35,630	46,630	23,630
Light lists, beacon and buoy lists.....	6,946	1,584	983	572	684	630	724	127	185
Monthly Weather Reviews. Signal Service.....	928	1,169	742	180	129	64	133	60	49
Miscellaneous publications.....	573	2,175	801		519	78	268	983	363
Form 105, sets.....	417	1,973	372	194	83	159	205	339	169
Vessels visited.....	2,781	3,362	1,327	1,676	91	423	95	606	249
Reports to Signal Service for Mascart cablegram.....	342	1,221	1,163	69					
Coast Survey notices to mariners.....	1,762	4,201		7,842	8,937	463	1,544	367	721

## DIVISION OF CHART CONSTRUCTION.

This division continues under the management of Mr. G. W. Littlehales, through whose industry, ability, and skillfulness I have been able to carry out various plans which have increased the capacity and improved the character of the work of the office. The inconvenience arising from want of room in the rented building on the corner of Seventeenth street and New York avenue, occupied by this division, has been partially overcome by excavating and building a new room for the power presses. Electric-motor power has been introduced and a large power lithographic press and a small hand-press installed, which inaugurates the practice of the art of lithography in the Hydrographic Office and will enable the office to be of service to the Department in the publication of special maps and to place in the hands of mariners a large amount of graphic information which now remains unpublished for lack of facilities. The greatest benefit, however, is that we are able to print the Pilot Chart, which has heretofore been done by contract with outside parties, and by the saving of this expense we are able to accomplish a much-desired object, the increase of the issue of the Pilot Chart, which has been limited by the want of a sufficient appropriation and the heavy cost of outside work.

The power-worked plate-printing press which was installed in January has been in successful operation ever since, and has so increased the capacity of the force of plate printers that the helpers who were formerly employed in turning the hand presses have been withdrawn to work on the new and important industry of manufacturing the chart from the rough copper obtained from the rolling mill. It is found that the requirements of the office can be more perfectly satisfied in this way. Since February twenty chart plates have been manufactured from the rough plates purchased at the rolling mill, at a cost, when finished, of 2 cents per square inch, which is one-third of the

lowest price at which they were ever purchased in a condition for engraving.

The present force consists of 1 computer, 1 clerk, 9 draftsmen, 11 engravers, 5 engravers' apprentices, 4 plate printers, 1 plate-printer's apprentice, 4 laborers, and 1 night watchman.

Fifty-five new charts have been engraved and published during the year. The general localities covered are the coasts of China, Japan, and Korea, including some of the most important harbors in the East, the coasts of Brazil and Chile, and of the West Indies. A general chart of the North Atlantic Ocean, showing the limits of the trade winds, the directions and rates of the currents, and the sailing and steamship routes for different seasons, has been prepared, and a series of great-circle sailing charts covering the whole of the commercial world has been completed and issued.

The work of charting the west coast of Lower California is finished as far as the survey has progressed, with the exception of Ballenas Bay, which was surveyed last winter by the U. S. S. *Thetis*. The data resulting from this survey have been received, but the plotting has been deferred until the results of the next season's work are available.

The following tabular statements give in detail all the work of chart-making and its kindred branches which has been accomplished during the year.

*Charts engraved on copper and published during the year ending June 30, 1892.*

General locality.	Catalogue number.	Title.	Scale.	Size.	When begun.	When finished.
<b>Canada.</b>			<i>Inches.</i>	<i>Inches.</i>		
West Indies.....	1272	Madame Island, and Lenox Passage	M. = 2.0	25 x 38	Sept., 1891	July, 1891
North America.....	1276	Island of St. Vincent.....	M. = 1.0	20.4 x 28.8	Oct., 1890	July, 1891
North Atlantic.....	1278	Naulmoo Harbor.....	M. = 5.0	18.7 x 26	Feb., 1891	Aug., 1891
South Atlantic.....	1280	Great Circle sailing chart of the North Atlantic Ocean.		25 x 38	June, 1891	Aug., 1891
North Pacific.....	1281	Great Circle sailing chart of the North Atlantic Ocean.		25 x 38	July, 1891	Aug., 1891
South Pacific.....	1282	Great Circle sailing chart of the North Pacific Ocean.		38 x 38	July, 1891	Aug., 1891
Indian Ocean.....	1283	Great Circle sailing chart of the South Pacific Ocean.		25 x 38	July, 1891	Sept., 1891
	1284	Great Circle sailing chart of the Indian Ocean; new series, with improved methods of obtaining courses and distances.		25 x 38	July, 1891	Sept., 1891
<b>China.</b>	1285	Amoy Harbor.....	M. = 6.0	21.2 x 27.8	Dec., 1891	Sept., 1891
<b>West Indies.</b>	1286	Port Antonio.....	M. = 6.0	13.3 x 15.7	July, 1891	Sept., 1891
	1287	(St. Ann Bay, Jamaica.	M. = 6.0	13.5 x 15.5)	July, 1891	Sept., 1891
<b>Do.</b>	1288	Ocho Rios Bay.....	M. = 3.0	4.1 x 4.9	July, 1891	Sept., 1891
<b>Do.</b>	1289	Falmouth Harbor, Jamaica.	M. = 8.0	15.5 x 15.5	July, 1891	Sept., 1891
<b>Japan.</b>	1290	Annato Bay.....	M. = 6.0	13 x 16	July, 1891	Oct., 1891
<b>Central America.</b>	1291	Gulf of Tokyo.....	M. = 0.75	26.5 x 39.3	May, 1890	Oct., 1891
	1292	Bluefields Lagoon.....	M. = 8.0	20.3 x 25.4	June, 1891	Oct., 1891
<b>Do.</b>	1293	Port Simon.....	M. = 10.0	15.8 x 20.5	Sept., 1891	Oct., 1891
<b>Madeira Island.</b>	1277	Funchal Bay.....	M. = 10.0	22.3 x 18	Mar., 1891	Nov., 1891
<b>Lower California.</b>	1294	Abasco Point Anchorage.....	M. = 2.0	24.4 x 26.5	May, 1891	Nov., 1891
<b>Gulf of Mexico.</b>	1295	Campesche Bay.....	M. = 25	27.3 x 40.1	May, 1891	Nov., 1891
<b>West Indies.</b>	1296	Savannah La Mar Anchorage.....	M. = 2.0	14.5 x 18	July, 1891	Nov., 1891
<b>Do.</b>	1297	Black River Anchorage.....	M. = 2.0	12.9 x 14.5	Aug., 1891	Nov., 1891
<b>South America.</b>	1298	Salute Islands.....	M. = 4.0	13.3 x 16.4	Oct., 1891	Nov., 1891
<b>West Indies.</b>	1299	Monte Christi to Fort Liberté Bay, including Mazamilla Bay.	M. = 1.0	24.1 x 30.8	Apr., 1891	Nov., 1891
<b>Korea and Japan.</b>	1302	Fort Liberté Bay.....	M. = 2.0	8.4 x 9.35	June, 1890	Nov., 1891
		The southwestern part of Japan, from the Bungo Channel on the east to the Oki Islands on the west, including Kyushu and adjacent islands, also the Korea Straits and adjacent coast of Korea from Cape Pelsaier to Quelpart Island.	D. long = 4.5	29.1 x 43.2		
<b>North America.</b>	1306	Esquimaux and Victoria Harbors, Vancouver Island.	M. = 6.0	26 x 36.9	Feb., 1891	Dec., 1891
<b>West Indies.</b>	1307	Las Cabañas Sanchez Road (Samana Bay).	M. = 4.0	11.2 x 13.2	Dec., 1891	Dec., 1891
<b>South America.</b>	1309	Port Chibichello (entrance to the Rio Parahiba do Norte).	M. = 4.0	10.2 x 24.9	Nov., 1891	Jan., 1892
<b>Lower California.</b>	1310	Corros Island to Abasco Point.....	M. = 0.25	20.8 x 35.8	Aug., 1891	Mar., 1892
<b>West Indies.</b>	1311	Saga In Grand Norte.....	M. = 2.0	32.8 x 35.5	Aug., 1891	Mar., 1892
<b>Brazil.</b>	1312	Rio Grande do Norte.....	M. = 4.0	15.4 x 23	Dec., 1891	Mar., 1892
<b>Chile.</b>	1313	Valparaiso, Valdivia.....	D. long = 4.5	28.1 x 41.5	Dec., 1891	Mar., 1892
<b>China.</b>	1303	Coasts of China and Korea, including the gulfs of Pechili and Liaoting.	D. long = 4.5	27.9 x 44.9	July, 1890	Apr., 1892
<b>West Indies.</b>	1317	Port San Juan.....	M. = 8.0	24.8 x 30.8	Sept., 1891	Apr., 1892
<b>Do.</b>	1318	Island of Dominica.....	M. = 1.0	25.2 x 38.4	Oct., 1891	Apr., 1892

*Charts engraved on copper and published during the year ending June 30, 1892—Continued.*

General locality.	Catalogue number.	Title.	Scale.	Size.	When begun.	When finished.
North Atlantic	1308	The North Atlantic Ocean, showing steamship and sailing routes, currents, and limits of trade winds.	<i>Inches.</i> D. long. = 0.45	37 x 38	Oct., 1891	May, 1892
Madeira	1312	Island of Madeira, Porto Santo, and Desertas	M. = 0.5	27.4 x 31.3	June, 1891	May, 1892
West Indies	1316	Plans of St. George Harbor, south coast of Grenada	M. = 7.0	32.7 x 39	July, 1890	May, 1892
China	1320	Prickly Point to Bucaye	M. = 3.0	8.7 x 12.6		
Chile	1321	Chilo, or Ventral Harbor	M. = 1.0	9.8 x 26.2	Nov., 1891	May, 1892
Chile	1322	Litico Road	M. = 2.0	14.3 x 15.5	Dec., 1891	May, 1892
Chile	1323	Approaches to Amoy	M. = 1.0	27.6 x 31	Feb., 1892	May, 1892
Venezuela	1324	Guanta Harbor	M. = 10.0	15.5 x 19	Apr., 1892	May, 1892
West Indies	1290	The West Indies, with the Gulf of Mexico and Caribbean Sea	D. long. = 1.3	16.4 x 22.4	Mar., 1891	June, 1892
Chile	1315	The Coast of Chile from Valdivia to Cape Tres Montes	D. long. = 4.0	32.2 x 51.3	Dec., 1891	June, 1892
Brazil	1319	Paranagua Bay	M. = 1.0	28.9 x 46.4	Nov., 1891	June, 1892
Chile	1325	Bahia de Todos os Santos	M. = 2.0	25.2 x 38.2	Aug., 1891	June, 1892
South America	1326	Cochimbo Bay and Port Herradura	M. = 2.0	29 x 35	Feb., 1892	June, 1892
Do	1327	Macabé Anchorage	M. = 6.0	23.6 x 30.7	June, 1892	June, 1892
Do	1328	Port la Plata	M. = 3.0	14.3 x 15.1	June, 1891	June, 1892
Japan	1329	Walima Anchorage	M. = 6.0	30.8 x 41.2	Apr., 1892	June, 1892
Brazil	1330	The east coast of Brazil from Pernambuco to Itacolomi Reef	D. long. = 4.5	14.5 x 18	Apr., 1891	June, 1892
Japan	1301	The coasts of Japan from the Gulf of Tokyo to Bungo Channel	D. long. = 4.5	27.5 x 43.1	Feb., 1890	June, 1892
The World	1334	Chart of submarine telegraphic cables of the world	D. long. = 0.04	72.1 x 46.2	May, 1892	June, 1892
Mexico	1335	Topolobampo Harbor	M. = 2.0	10.1 x 15.7	Sept., 1892	June, 1892
Japan	1336	Sakai Harbor	M. = 4.0	30 x 30.1	Feb., 1892	June, 1892
				18.5 x 25.3		

## MISCELLANEOUS PLATES ENGRAVED DURING THE YEAR.

**Index to Hydrographic Office Charts** alluded to in the sailing directions for the Gulf and River St. Lawrence and for Nova Scotia and the Bay of Fundy.

Illustration of the main triangulation of the coast of Lower California between Cerros Island and Abreojos Point to accompany the report on the methods and results of the *Ranger's* survey.

Illustration of the secondary triangulation of the coast of Lower California in the vicinity of San Bartolomé Bay to accompany the report on the methods and results of the *Ranger's* survey.

Illustration of the secondary triangulation of the coast of Lower California in the vicinity of Abreojos Point to accompany the report on the methods and results of the *Ranger's* survey.

*Charts which have received important corrections and additions amounting to a redrawing of a portion of the chart.*

General locality.	Catalogue number.	Title.	Character of corrections.
Pacific Ocean .....	1211	Phoenix and Canton Islands, and Canton Island Anchorage.	Complete redrawing of chart. Entire reproduction of topography and hydrography from recent surveys.
Do .....	126	Union Group.....	New plan of Bowditch (Fakaafu) Island from a survey in 1889.
Japan .....	53	Strait of Tsugaru.....	Extensive changes in hydrography, with considerable additions.
South America .....	75	Orange Bay, Nassau Bay ...	Extensive corrections in hydrography and additions.
Do .....	76	Seagull Harbor, Wollaston Islands.	Do.
Pacific Ocean .....	85	Dean, Krusenstern, Lazareff Islands.	Addition of plan of Tiputa Pass from French survey of 1877.
Newfoundland .....	581b	Newfoundland, southern portion.	Extensive correction in outlines and hydrography between La Poile Bay and Fortune Bay, from new British surveys.
China .....	929	Hongkong harbor and approaches.	Numerous corrections in topography and hydrography.
Mexico .....	993	Tampico Harbor.....	Extensive corrections giving new jetties, harbor works, topography, etc.
South Pacific Ocean	825a	South Pacific Ocean, western middle sheet; upper part.	Changes in positions of islands and reefs, additional names, soundings, rocks, shoals, and cautionary notes.
Brazil .....	491	Santos Bay and Harbor ...	Changes in topography and hydrography.
North America .....	961	The eastern end of Vancouver Island from Barclay Sound on the south to Nanoose Harbor on the north, and including Juan de Fuca, Rano, and Rosario straits, the adjacent islands and coasts of Washington and British Columbia, from Cape Flattery to Burrard Inlet.	Numerous corrections in hydrography.
Japan .....	187	Simoda Harbor, Nippon Island.	Numerous corrections in hydrography.
China .....	797	China Sea, southern portion, western sheet.	Parts of coast lines of the Malay peninsula and the islands of the neighboring archipelago, together with the adjacent hydrography reengraved from recent French government surveys.
Chile .....	451b	Port Barbaba, Campana Island, Port Otway, in Gulf of Penas.	Extensive corrections in outlines and addition of hydrography from German survey, 1883-'84.
New Brunswick....	149	Harbor of St. John .....	Extensive correction in outlines and hydrography.
Atlantic .....	22a	North Atlantic Ocean, eastern part, upper sheet.	Extensive corrections to the coasts of Greenland and Iceland, and readjustment of all lights and light-vessels; removing all lights not visible 10 miles, and adding all visible over 10 miles and not previously shown.



*Charts which have received important corrections and additions amounting to a redrawing of a portion of the chart—Continued.*

General locality.	Catalogue number.	Title.	Character of corrections.
Japan.....	549a	Seto Uchi or Inland Sea (Japan), sheet I, western part, from the Kurushima-Seto to Simonoseki Strait.	This chart has been practically reconstructed, over four-fifths of the work having been redrawn and reengraved.
Venezuela.....	992	La Guayra.....	Extensive changes in harbor works.
West Indies.....	1005	Island of Trinidad.....	Extensive changes on east coast of the island, chiefly in hydrography.
Cuba.....	307	Havana Harbor.....	Entirely new hydrography from a recent survey, with some changes in topography.
Chile.....	1117	Valparaiso Harbor.....	Extensive changes in shore line and topography, new wharves and buildings, shoals off point, etc.
China.....	796	China Sea, northern portion, western sheet.	Parts of coast line of Cochin China and adjacent hydrography reengraved from recent French Government surveys.

*Chart plates electrotyped during the fiscal year.*

General locality.	No.	Title.	Kind of plate made.	Size.	When finished.
North Atlantic Ocean.....	1070	North Atlantic.....	Basso...	40x41	Sept., 1891
South America.....	445	Strait of Magellan, western part.....	Alto....	28x49	Dec., 1891
China.....	1255	Shanghai Harbor.....	do.....	28x36	Dec., 1891
Japan.....	1270	Nagasaki Harbor.....	do.....	30x35	Dec., 1891
China.....	1285	Amoy Harbor.....	do.....	24x31	Dec., 1891
Do.....	1254	Hongkong Harbor.....	do.....	30x40	Jan., 1892
South America.....	445	Strait of Magellan, western part.....	Basso...	28x49	Jan., 1892
Lower California.....	1268	Auuncion and San Roque bays.....	Alto....	27x29	Mar., 1892
North America.....	1272	Madame Island and Lennox Passage.....	do.....	28x47	Mar., 1892
East Indies Archipelago.....	1266	Gaspar Strait.....	do.....	24x53	Mar., 1892
West Indies.....	1279	Island of St. Vincent.....	do.....	23x32	Mar., 1892
Lower California.....	1310	Cerro Island to Abrejos Point.....	do.....	33x42	May, 1892
		Telegraphic chart of the world.....	do.....	11x17	Mar., 1892
	923	Track chart of the world.....	Basso...	30x50	June, 1892
Canada.....	1247	Passamaquoddy Bay and approaches.....	Alto....	33x38	June, 1892
West Indies.....	1261	Island of St. Lucia.....	do.....	28x42	June, 1892

PLATE-MAKING AND PRINTING.

Eighteen plates were purchased, twenty were manufactured from the rough plates received from the rolling mill, and eight were made by scouring down and polishing condemned plates on which the engraving had become obsolete. Four engraved plates were withdrawn from use. The number of copper and steel chart-plates available for printing charts is 677. From these were printed 26,578 copies for issue and 339 proofs for office use. There are also 110 miscellaneous engraved plates, from which 4,656 copies were printed. The total number of accepted copies of plates printed is 31,234. In addition the force of printers was employed in miscellaneous printing and stamping as follows:

Official letter paper.....	reams..	18½
Official note paper.....	do.....	6½
Official envelopes.....		3,360
Official cards.....		1,800

*Summary.*

	Total to June 30, 1891.	Finished during the year.	With- drawn during the year.	Total to June 30, 1891.
Engraved chart plates.....	625	55	4	677
Miscellaneous plates.....	106	4		110
Altos of engraved chart plates.....	165	13		178
Basos of engraved chart plates.....	79	3		82
Impressions of engraved plates for use.....				31,234
Proofs of engraved plates for office use.....				654

*Charts in progress of construction unfinished at the close of the fiscal year.*

General locality.	Cata- logue No.	Preliminary title.	Scale.	Size.	When be- gun.
			<i>Inches.</i>	<i>Inches.</i>	
Newfoundland.....	59p	Northeast Newfoundland ..	D. lat. = 13.0	24 x 34.5	Dec., 1887
Ecuador.....	107p	Guayaquil River.....	M. = 0.5	24 x 41	Nov., 1888
Japan.....	175p	The Strait of Tsugaru to Yokohama.	D. long. = 4.5	26.7 x 45.3	June, 1890
China.....	182p	The mouth of the Yangtze Kiang to Amoy.	D. long. = 4.5	32.7 x 43.3	Oct., 1891
United States of Colombia.....	238p	Chiriqui Lagoon.....	M. = 1.0	35 x 45.1	Do.
Brazil.....	256p	Santa Cruz to Rio de Jan- eiro.	D. long. = 4.6	25.8 x 43.2	July, 1891
Do.....	278p	Rosario to Cape Palmar....	D. long. = 4.5	37 x 42	Sept., 1891
West Indies.....	279p	Island of New Providence.	M. = 2.0	29 x 42.1	Oct., 1891
Korea.....	487p	Ping Yang Inlet.....	M. = 0.75	29 x 39	Jan., 1892
Japan.....	291p	Simunoseki Strait.....	M. = 2.0	31.2 x 41.3	Feb., 1892
Do.....	295p	Miyatsu Bay and vicinity.	M. = 0.5	18.6 x 25.2	Do.
Do.....	296p	Tsuruga Bay.....	M. = 1.0	14.9 x 21	Do.
Brazil.....	297p	Maranhao and approaches.	M. = 0.5	26.2 x 54.3	Mar., 1892
Do.....	298p	Para and approaches.....	M. = 1.5	24.6 x 38	Do.
Japan.....	301p	Uraga Harbor.....	M. = 6.0	16.7 x 22.7	Apr., 1892
Do.....	300p	Esaki Port.....	M. = 8.0	14 x 18.7	Mar., 1892
Do.....	301p	Susa Port.....	M. = 8.0	19.4 x 25.8	Apr., 1892
Cuba.....	305p	Port Matanzas.....	M. = 6.0	30.8 x 39.8	Do.
China.....	307p	The Yangtze Kiang and the approaches to Shanghai.	M. = 0.5	28 x 45.0	Do.
Japan.....	308p	Shimizu Harbor.....	M. = 3.0	14.4 x 19.5	May, 1892
Do.....	309p	Tateyama Bay.....	M. = 2.0	16.9 x 21.8	Do.
River St. Lawrence.....	310p	Montreal to Cape St. Michel	M. = 2.0	26 x 38.5	Do.
Cuba.....	311p	Jucaro Anchorage.....	M. = 1.0	10.2 x 15	Do.
River St. Lawrence.....	312p	Montreal to Beauharnois Canal.	M. = 2.0	26 x 37.4	Do.
Do.....	314p	Cornwall to Monille Point..	M. = 2.0	26.5 x 37	June, 1892
Do.....	315p	Quebec to Grasse River....	M. = 2.0	26 x 36	Do.
Do.....	320p	Sorel to La Valtrie.....	M. = 2.0	26 x 36	Do.
Do.....	321p	La Valtrie to Cape St. Mi- chel.	M. = 2.0	26 x 36	Do.
Brazil.....	266p	Rio de Janeiro to Rosario ..	D. long. = 4.5	31.5 x 45.3	July, 1891

*Charts undergoing extensive corrections unfinished at the close of the fiscal year.*

General locality.	Cata- logue No.	Title.	Character of correction.
Gulf of St. Lawrence...	1107	Amherst Harbor .....	Entirely reengraved from new surveys.
Hawaiian Islands.....	867	South side of Oahu .....	Hydrography and topography of Maunaloa Bay and of the coast between Wailea and Makapuu points reengraved.
Chile.....	445	The Strait of Magellan; west- ern part.	All hydrography reengraved from the most recent surveys.
Choo Islands.....	510	Hancock Bay, Ooshima .....	Charted that portion which lies west of Ogle Point, which has been heretofore in outlines.
.....	920	Port Malaga.....	Extensive changes in topography along the water front and in the breakwaters, which inclose the artificial harbor.

## DISTANCES.

The work of computing and recording distances by sea routes between various ports, as required by the committees of Congress and the various departments of the Government has been continued. The distances over the ocean mail routes described in the postal subsidy act of March 3, 1891, were computed as required by that act, and furnished to the Postmaster-General.

METHODS AND RESULTS OF THE *RANGER'S* SURVEY.

This report has for its object the setting forth of the methods of conducting a marine survey which have been gradually developed in the survey of the west coast of Mexico and Central America by the officers of the U. S. S. *Ranger* with a view of securing to future workers in the same field the benefits of experience, and of making still further advances in this important branch of nautical science. It includes accounts of the methods of conducting the reconnaissances, the order of operations, and full descriptions of the various branches of the work with the results secured.

## DEEP-SEA SOUNDINGS.

Two additional deep-sea sounding sheets covering the lower part of the South Atlantic Ocean between Cape Horn and the Cape of Good Hope have been constructed on a scale of 1.5 inches to the degree of longitude. There are now 49 deep-sea sounding sheets on a scale of 1.5 inches to the degree of longitude, covering the Atlantic, Pacific, and Indian oceans, and containing all the reliable deep-sea soundings that have been taken up to the present time.

## RECORDS.

The records of the costs of work of various kinds, of the construction and correction of charts, and of geographic positions and magnetic observations both at sea and at shore stations have been kept up. Charts of the lines of equal magnetic variation on the coasts of China and the East, of Brazil, and of the southeastern section of the West Indies have been constructed in connection with the current work in those regions. The collection of observations of the variation of the compass for the past two years from mercantile vessels has shown that the department can not rely upon this source of information for the means of keeping the isogonic charts up to date. It appears that this work must necessarily be performed by the vessels of the governments of the great commercial nations, and that the necessity of employing special vessels for this service will be more apparent as we recede from the epoch when general navigation in iron vessels began.

## DIVISION OF SAILING DIRECTIONS.

This division has been for the past year under the charge of Lieut. R. G. Davenport, U. S. Navy.

By the publication of H. O. No. 100, the Gulf and River St. Lawrence, issued January 12 last, we have for the first time a complete set of United States official sailing directions for both coasts of North, Central, and South America and the West Indies.

In addition to routine duties the compilation of new sailing directions supplements to old editions and the revision of the old editions has been steadily proceeded with, as shown by the following statements.

**The following publications were placed on issue:**

- O. No. 98. Uniform System for Spelling Foreign Geographic Names.
- O. No. 97. Determination of Longitudes in Mexico, Central America, the West Indies, and on the North Coast of South America, 1888, 1889, 1890.
- H. O. No. 99. Nova Scotia and Bay Fundy and South Shore of Gulf of St. Lawrence.
- H. O. No. 100. Gulf and River St. Lawrence and Cape Breton Island.
- H. O. No. 9. Bowditch Navigator.
- H. O. No. 13. Bowditch Useful Tables.
- H. O. No. 86. Caribbean Sea and Gulf of Mexico, vol. I, third edition.
- Catalogue of charts, plans, sailing directions, and other publications of the U. S. Hydrographic Office.
- Annual Report of the Hydrographer to the Bureau of Navigation for the fiscal year ending June 30, 1891.

Supplements to the following Sailing Directions were prepared and placed on issue, as also were sheet corrections for various sailing directions other than those published by this office:

- H. O. No. 41. Reported Dangers to Navigation in the North Pacific Ocean.
- H. O. No. 41<sup>a</sup>. Reported Dangers to Navigation in the South Pacific Ocean.
- H. O. No. 64. Caribbean Sea and Gulf of Mexico, Vol. II, Gulf Coast of the United States.
- H. O. No. 96. The Coast of British Columbia, including Juan de Fuca Strait, Vancouver, and Queen Charlotte Islands.
- H. O. No. 73. Newfoundland and Labrador, including Davis Strait, Baffin Bay, and Smith's Sound.
- H. O. No. 34. English Channel, Part I, South Coast of England.
- H. O. No. 35. English Channel, Part II, North Coast of France and the Channel Islands.
- H. O. No. 89. West Coast of South America, including Magellan Strait, Terra del Fuego and the outlying islands.
- H. O. No. 37. Coasts and Islands, Mediterranean Sea, 3d ed., Part I.
- H. O. No. 38. Coasts and Islands, Mediterranean Sea, 3d ed., Part II.
- H. O. No. 42. Coasts and Islands, Mediterranean Sea, 3d ed., Part III.
- H. O. No. 68. Coasts and Islands, Mediterranean Sea, 3d ed., Part IV.
- H. O. No. 85. The Indian Ocean, including Java Sea, Sulu Sea, Aduera Sea, and the Philippine Islands.

Printed and in the hands of the printer being bound:

- H. O. No. 31—Light List No. 2—South and East Coasts of Africa and the East Indies, including the East India Islands, China, Japan, Australia, Tasmania, and New Zealand.

The following were revised, kept correct to date, and are ready for issue:

- Azores, Madeira and Cape Verde Islands.
- Bay of Biscay, third edition.
- List of Lights of the World, sixth edition, six volumes.

Sailing directions in preparation:

- Navigation of the Pacific Ocean.
- West Coast of Africa, Volume I.

**The following new publications were received and put on issue:**

- United States Coast and Geodetic Survey.
- United States Coast Pilot, Atlantic Coast, Parts I and II.
- Pacific Coast Pilot, Alaska, Part I.
- Tide Tables, Atlantic Coast, 1892 and 1893.
- Tide Tables, Pacific Coast, 1892.
- Life Stream, Investigation and Results, Lieut. Pillsbury, U. S. N.
- Directions to Mariners.
- Catalogue of Charts, Plans, and Sailing Directions.
- United States Light-house Board:
- Beacons, Buoys, and Day Marks for the various Districts, 1891 and 1892.
- Directions to Mariners.
- United States Treasury Department:
- Merchant Vessels, 1891.
- United States Nautical Almanac office:
- Nautical Almanac, 1893.
- Nautical Almanac, 1893.

## From United States Nautical Almanac office—Continued.

Atlantic Coasters' Nautical Almanac, 1892.

Pacific Coasters' Nautical Almanac.

## From British Admiralty (purchased):

New Zealand Pilot, 1891.

Eastern Archipelago, Part I, 1891.

Pacific Islands, Vol. II, 1891.

West Coast of England, 1891.

West Coast of Hindustan, 1891.

Islands in the Indian Ocean West of 80° East.

Admiralty Catalogue of Charts and Plans, 1892.

Tide Tables, British and Irish Ports, 1892.

Revised Supplement to China Sea Directory, Vol. III, 1891.

H. N. 4, of 1891, Relating to Australian Directory, Vol. II.

H. N. 6, of 1891, Relating to Eastern Archipelago, Part II.

H. N. 7, of 1891, Relating to Africa Pilot, Part III.

Light List, Western Coast of Europe.

Light List, British Islands, 1892.

Light List North, Baltic, and White Seas, 1892.

N. B.—The purchase of these three British Admiralty light lists was necessary on account of the appropriation not being sufficient to publish a new edition of the Hydrographic Office Light Lists, all of which have been kept ready for the press; the old editions covering the grounds of those purchased have become practically worthless, owing to the many changes and additions to the lights and are no longer referred to.

## From B. F. Stevens, London (sent directly to ships on foreign stations):

H. N. 4, of 1891, relating to Australia Directory, Vol. II.

Eastern Archipelago, Part I.

Supplement to China Sea Directory, Vol. III.

New Zealand Pilot, 1891.

Pacific Islands, Vol. II.

H. N. 6, of 1891, Relating to Eastern Archipelago, Part II.

West Coast of Hindustan Pilot, 1891.

Islands in the Indian Ocean West of 80° East.

H. N. 7, of 1891, Relating to Africa Pilot, Part III.

The following publications were withdrawn from issue, being canceled by later editions placed on issue during the year:

- H. O. No. 33—Light List No. 4 }  
 H. O. No. 74—Light List No. 5 } (Canceled by B. A. Light Lists).  
 H. O. No. 75—Light List No. 6 }  
 H. O. No. 86—Caribbean Sea and Gulf of Mexico, Vol. II, second edition.  
 Catalogue of charts, plans, sailing directions, and other publications of the U. S. Hydrographic office, 1890.  
 Supplement to Reported Dangers in the North Pacific Ocean, edition of 1887.  
 Supplement to Reported Dangers in the South Pacific Ocean, edition of 1887.  
 Supplement to West Coast of South America, edition of 1890.  
 Supplement to Coasts and Islands, Mediterranean Sea, Part I, 2d edition.  
 Supplement to Coasts and Islands, Mediterranean Sea, Part II, 2d edition.  
 Supplement to Coasts and Islands, Mediterranean Sea, Part III, 2d edition.  
 Supplement to Coasts and Islands, Mediterranean Sea, Part IV, 2d edition.  
 Pacific Coast Pilot, Alaska, Part I, 1883 (C. S.).  
 Catalogue of Charts and Plans, 1891 (C. S.).  
 List of Beacons, Buoys, and Stakes, various districts, edition of 1890-'91 (L. H. B.).  
 List of Merchant Vessels, 1890.  
 Nova Scotia and Bay of Fundy, 1885 (B. A.).  
 Gulf and River St. Lawrence, Vol. I, 1882 (B. A.).  
 Gulf and River St. Lawrence, Vol. II, 1881 (B. A.).  
 New Zealand Pilot, 1883 (B. A.).  
 West Coast of England, 1884 (B. A.).  
 Pacific Islands, Vol. II, 1885 (B. A.).  
 Pacific Island, Vol. III, 1883 (B. A.).  
 The Fiji Islands, 1882 (B. A.).  
 West Coast of Hindustan 1880 (B. A.).  
 Light List, Western Coast of Europe, 1891 (B. A.).  
 Light List, British Islands, 1891 (B. A.).  
 Light List, North, Baltic, and White Seas 1891 (B. A.).  
 Catalogue of Charts, Plans, etc., 1891 (B. A.).  
 Tide Tables, British and Irish Ports 1891 (B. A.).  
 Supplement to China Sea Directory Vol. III, 1888 (B. A.).

## VESSELS FITTED OUT.

The following vessels were supplied with outfits of sailing directions and nautical books from this division:

Name of ship.	Outfit furnished.	Remarks.
<i>Concord</i> .....	North Atlantic station .....	Regular outfit for cruising.
Do .....	Special Pacific .....	Do.
<i>Charleston</i> .....	Asiatic station .....	Do.
<i>Petrel</i> .....	do .....	Do.
<i>Yantic</i> .....	South Atlantic station .....	Do.
<i>Yorktown</i> .....	Pacific station .....	Do.
<i>Boston</i> .....	do .....	Do.
<i>Minionomoh</i> .....	North Atlantic station .....	Do.
<i>Newark</i> .....	Special South Atlantic and Pacific.	Do.
<i>Atlanta</i> .....	do .....	Do.
<i>Chicago</i> .....	Additional books for South Atlantic station.	Do.
<i>Bennington</i> .....	do .....	Do.
Do .....	Special Pacific .....	Do.
<i>Mer Indiana</i> .....	Special .....	For crossing to Russia.
Do .....	Asiatic station .....	Regular outfit for cruising.
<i>Adams</i> .....	Pacific station .....	Do.
<i>Dolphin</i> .....	North Atlantic station .....	Do.
<i>Passaic</i> .....	Special .....	Between Norfolk and Boston.
<i>L. H. T. Lilac</i> .....	do .....	Between Boston and Montreal.
<i>L. H. T. Columbine</i> .....	do .....	Between New York and Montreal.
<i>Monongahela</i> .....	do .....	To complete outfit.

## ARCHIVES.

*Documents.*—In the compilation and revision of sailing directions the has been adopted of writing to the United States consulates within the limits covered by the publication for the latest information. This, combined with the reports called for in obedience to of Navigation Order, No. 18, of 1891, has vastly increased the amount of data received, which, during the year amounted to 647 documents, which were indexed and catalogued. In addition to these documents there have been indexed, catalogued, and placed on the shelves reference, 382 books and 311 pamphlets and serial publications, all more or less relating to hydrography.

For the documents we are indebted to the following:

## United States vessels of war:

- U. S. F. C. S. *Albatross*, Lieut. Commander Z. L. Tanner, commanding.
- U. S. S. *Alert*, Commander R. D. Hitchcock, commanding; Lieut. R. Wainwright, commanding, and Lieut. D. H. Mahan, navigator.
- U. S. S. *Alliance*, Commander Felix McCurley, commanding; Lieut. S. P. Comly, navigator.
- U. S. S. *Atlanta*, Capt. F. J. Higginson, commanding, and Capt. J. W. Philip, commanding; Lieut. G. P. Colvocoresses, Lieut. H. Osterhaus, navigators.
- U. S. S. *Bennington*, Commander R. B. Bradford, commanding; Lieut. C. E. Colahan, navigator.
- U. S. S. *Boston*, Capt. G. C. Wiltse, commanding; Lieut. E. K. Moore, navigator.
- U. S. S. *Charleston*, Capt. G. C. Remey, commanding.
- U. S. S. *Chicago*, Capt. J. N. Miller, commanding; Lieut. R. P. Rodgers, navigator.
- U. S. S. *Concord*, Commander O. N. Batcheller, commanding; Lieut. J. N. Briggs, navigator.
- U. S. S. *Essex*, Commander A. S. Snow, commanding.
- U. S. S. *Fern*, Lieut. Commander A. J. Iverson, commanding.
- U. S. S. *Irigquois*, Commander J. J. Read, commanding; Lieut. S. C. Paine, navigator.
- U. S. S. *Jamestown*, Commander C. F. Goodrich, commanding; Lieut. Perry Garst, navigator.
- U. S. S. *Recharge*, Commander H. Elmer, commanding; Lieut. J. E. Roller, navigator.
- U. S. S. *Seely*, Capt. H. B. Seely, commanding; Lieut. E. B. Barry, navigator.

## From United States vessels of war—Continued.

U. S. S. *Marion*, Commander J. R. Bartlett, commanding.  
 U. S. S. *Mohican*, Commander C. S. Cotton, commanding.  
 U. S. S. *Monongahela*, Commander J. H. Sands, commanding; Lieut. W. W. Kimball, navigator.  
 U. S. S. *Pensacola*, Capt. A. Kautz, commanding; Lieut. W. H. Beehler, navigator.  
 U. S. S. *Petrel*, Lieut. Commander M. R. S. Mackenzie, commanding; Lieut. J. M. Orchard, navigator.  
 U. S. S. *Philadelphia*, Capt. F. Rodgers, commanding; Lieut. A. Marix, navigator.  
 U. S. S. *Pinta*, Lieut. Commander O. W. Farenholt, commanding; Lieut. D. Peacock, navigator.  
 U. S. S. *Ranger*, Commander F. M. Cook, commanding.  
 U. S. S. *San Francisco*, Capt. W. T. Sampson, commanding, Lieut. J. F. Moser, navigator.  
 U. S. S. *Tallapoosa*, Commander J. M. Forsyth, commanding, Lieut. J. K. Cogswell, navigator.  
 U. S. S. *Thetis*, Commander G. C. Reiter, commanding, Lieut. W. V. Bronaugh, navigator.  
 U. S. S. *Yantic*, Lieut. Commander S. Belden, commanding, Lieut. A. Mertz, navigator.  
 U. S. S. *Yorktown*, Commander R. D. Evans, commanding, Lieut. W. P. Conway, navigator.

## From the various United States Consulates:

United States Consul-General, R. O. Williams, Havana, Cuba.  
 United States Consul-General, J. S. Durban, Port au Prince, Haiti.  
 United States Consul-General, W. D. Tillotson, Kanagawa, Japan.  
 United States Consul-General, J. A. Leonard, Shanghai, China.  
 United States Consul-General, Richard G. Lay, Ottawa, Canada.  
 United States Consul, J. A. Jones, Aden, Arabia.  
 United States Consul, C. T. Grellet, Algiers, Africa.  
 United States Consul, E. Bedloe, Amoy, China.  
 United States Consul, W. K. Sullivan, Hamilton, Bermuda.  
 United States Consul, C. Seymour, Canton, China.  
 United States Consul, S. Goutier, Cape Haitien, Haiti.  
 United States Consul, G. F. Hollis, Cape Town, Africa.  
 United States Consul, H. A. Ehninger, Cienfuegos, Cuba.  
 United States Consul, H. B. Ryder, Copenhagen, Denmark.  
 United States Consul, A. F. Dickson, Gaspé Basin, Quebec.  
 United States Consul, J. Worthington, Malta Island.  
 United States Consul, T. J. McLain, jr., Nassau, New Providence.  
 United States Consul, J. M. Ayres, Para, Brazil.  
 United States Consul, C. Bartlett, Guadeloupe, West Indies.  
 United States Consul, W. Peter, St. Lucia, West Indies.  
 United States Consul, D. C. Van Romondt, St. Ma tins, West Indies.  
 United States Consul, A. B. Keevil, Martinique, West Indies.  
 United States Consul, T. Simpson, Santo Domingo, West Indies.  
 United States Consul, W. A. Brown, San Juan del Norte, Nicaragua.  
 United States Consul, Henry Pease, Santiago, Cape Verde Islands.  
 United States Consul, O. E. Reimer, Santiago de Cuba.  
 United States Consul, L. W. Meyers, Victoria, British Columbia.  
 United States Consul, E. D. Ropes, jr., Zanzibar.  
 United States Vice-consul, E. A. Dimmick, Antigua Island, West Indies.  
 United States Vice-consul, G. H. Seidmore, Kanagawa, Japan.  
 United States Vice-consul, H. Heidegger, Matanzas, Cuba.  
 United States Vice-consul, P. Lallier, Teneriffe, Canary Islands.  
 United States Consular Agent, W. Rey, Aquilla, West Indies.  
 United States Consular Agent, G. E. Davis, Port Antonio, Jamaica.  
 United States Consular Agent, H. E. Roberts, Aux Cayes, Haiti.  
 United States Consular Agent, J. Hardy, Azua, Santo Domingo.  
 United States Consular Agent, N. E. B. Munroe, Danmore Town, Bahamas.  
 United States Consular Agent, W. B. Dickey, Baracoa, Cuba.  
 United States Consular Agent, J. H. Baiz, Barcelona, Venezuela.  
 United States Consular Agent J. J. Nunes, Brava Island, Cape Verde Islands.  
 United States Consular Agent S. P. C. Henriques, Cardenas, Cuba.  
 United States Consular Agent W. Stedman, Dominica Island, West Indies.  
 United States Consular Agent W. S. Hollis, Durban, Natal, Africa.  
 United States Consular Agent C. A. Nunes, Falmouth, Jamaica.  
 United States Consular Agent J. McKay, Flores, Azores.  
 United States Consular Agent M. Girard, Frontera, Mexico.  
 United States Consular Agent J. H. Beola, Gibara, Cuba.

**From the various United States Consulates—Continued.**

United States Consular Agent C. A. Bethel, Governors Harbor, Bahamas.  
 United States Consular Agent F. F. Morris, Guantánamo, Cuba.  
 United States Consular Agent D. D. Sargent, Inagua Island, West Indies.  
 United States Consular Agent J. Vital, Jacmel, Haiti.  
 United States Consular Agent L. T. Ronzier, Jérémie, Haiti.  
 United States Consular Agent J. G. Topham, Lanzarote, Canary Islands.  
 United States Consular Agent W. Stakeman, Manzanillo, Cuba.  
 United States Consular Agent G. L. P. Corinaldi, Montego, Jamaica.  
 United States Consular Agent R. Gillis, Nuevitas, West Indies.  
 United States Consular Agent L. J. Lyon, Port Marie, Jamaica.  
 United States Consular Agent L. D. Baker, Port Morant, Jamaica.  
 United States Consular Agent D. M. Mullen, Sagua la Grande, Cuba.  
 United States Consular Agent M. Solomons, St. Anns Bay, Jamaica.  
 United States Consular Agent R. B. Dinzey, St. Bartholome, West Indies.  
 United States Consular Agent S. W. Parker, St. Christopher, West Indies.  
 United States Consular Agent L. L. Taylor, St. Croix, West Indies.  
 United States Consular Agent T. Behrman, Port de Paix, Haiti.  
 United States Consular Agent W. W. Nicholls, St. Michaels, Cape Verde.  
 United States Consular Agent W. J. Shearman, St. Vincent, West Indies.  
 United States Consular Agent C. H. Farquharson, Savannah-la-Mar, Jamaica.  
 United States Consular Agent D. F. Harriott, Salt Cay, Turks Island.  
 United States Consular Agent S. B. Horne, St. Thomas, West Indies.  
 United States Consular Agent T. H. Grosewisch, Valencia, Venezuela.

**Charts.**—Summary of new or revised charts received and of old ones condemned by cancellation.

	Received.	Con- demned.		Received.	Con- demned.
<i>Hetavian</i> .....	11	3	<i>Netherlands</i> .....	2	2
<i>British Admiralty</i> .....	629	565	<i>Russia</i> .....	10	2
<i>Brazilian</i> .....	47	7	<i>Spanish</i> .....	16	21
<i>Canadian</i> .....	20	0	<i>Swedish</i> .....	13	13
<i>Danish</i> .....	22	16	<i>Coast and Geodetic Survey</i> ..	183	156
<i>French</i> .....	51	122	<i>U. S. Engineers, Lake Survey</i> ..	24	22
<i>German</i> .....	6	1	<i>U. S. Hydrographic Office</i> .....	392	0
<i>Imray &amp; Sons (London)</i> .....	5	5			
<i>Italian</i> .....	35	18	<b>Total from June, 1891</b> ..	1,510	1,011
<i>Japanese</i> .....	44	58			

**NOTICES TO MARINERS.**

Under the direction of the chief of division, the Notices to Mariners continue to be edited by Mr. Boynton Leach.

During the year 1,109 announcements of importance to navigation were published in the usual form of Notices to Mariners, which were issued promptly on Saturday of each week, and the aggregate issue of which, together with the extracts, amounted to 783,546.

Many reports and the usual foreign Notices to Mariners have been received and all requiring it translated, the more important notices being republished, as well as a large amount of original matter from reports of United States vessels of war and consuls, and also the reports of correspondents in the merchant marine of various nationalities. By reason of the small printing fund, the publication of three of the Light Lists, viz, IV, V, and VI, published by this office has been temporarily suspended and admiralty publications covering the same are purchased and issued instead. Of the three remaining volumes, II, III, and III, Vol. II is in press and only remains to be bound before

In this issue no vacant numbers are inserted and the cost of the plates thereby been decreased. The form of spelling many names has been changed to conform with the general system laid down by the United States Board on Geographic Names.



## SUMMARY.

*Books, pamphlets, documents, etc., received, issued, prepared, etc.*

<b>Received:</b>	
Sailing directions (including 539 foreign publications purchased).....	9, 799
Books of reference.....	382
Pamphlets for reference.....	311
Charts for reference.....	1, 510
Documents, original.....	647
Issued Sailing Directions (including 554 foreign publications).....	6, 605
Canceled Sailing Directions.....	36
Condemned Sailing Directions and supplements.....	774
Condemned charts.....	1, 011
Prepared and placed on issue Sailing Directions and supplements.....	23
Prepared and in hands of Public Printer.....	3
Prepared and ready for printer.....	3
Preparing.....	2
New United States other than Hydrographic Office editions placed on issue	12
New British Admiralty publications placed on issue.....	15
Announcements of importance to navigation made in Notices to Mariners	1, 109
Notices to Mariners and extracts published.....	783, 546

## DIVISION OF SUPPLY AND ISSUE.

This division consists of two separate sections, which are under the charge of Lieut. J. M. Robinson and Lieut. H. Kimmel. Ensign L. S. Van Duzer, the former energetic head of the division, was detached on March 17, his term of duty having expired.

No change has been made during the year in the methods previously established of supplying charts to vessels in commission, to branch offices, agents, etc., nor in the methods of correcting charts and keeping accounts.

In the Hydrographic Office section there are at present 885 charts, published by this office. Of this number 674 are engraved charts and 211 are photolithographic. Fifty-six new engraved charts have been received during the year and 2 new photolithograph charts.

The number of photolithograph charts on hand at the beginning of the year has been reduced by 32. Of this number 30 have been replaced by engraved charts; 1 is exhausted and 1 condemned. Of the 211 photolithograph charts remaining 12 have been withdrawn from sale, there being only a sufficient number left to supply the needs of naval vessels until such time as they may be replaced by engraved charts.

The edition of the following photolithographs is nearly exhausted, and being largely in demand will be replaced by engraved charts at as early a date as possible, viz, 386 and 387, Chiriqui Lagoon and Almirante Bay; 306, Bahia de Todos or Santos; 395, Serrana Bank and other plans.

A new catalogue of the North Atlantic Station, prepared by Ensign L. S. Van Duzer, was issued to the vessels of that station June 10. This is the most complete, comprehensive, and methodically arranged catalogue yet issued from this office. The new catalogue of the Pacific Station, also prepared by Mr. Van Duzer is now in the hands of the printer and will be issued as soon as published.

Catalogues on the new plan for the other stations will be issued as soon as practicable.

Statement of charts for year ended June 30, 1882.

	1881.				1882.				Total for year.	
	Third quarter.		Fourth quarter.		First quarter.		Second quarter.			
	E	O	E	O	E	O	E	O	E	O
Copies of charts rec'd.										
From Division of Chart Construction	6,338		5,172		7,779		6,237		25,326	
From Coast Survey	25		24		25		77		151	
From other sources.	25		14		25		77		151	
Total	6,388		5,210		7,829		6,391		25,628	
Copies of charts issued.										
To naval vessels	12,174		12,745		12,800		807		38,526	
To agents	1,134		1,373		1,315		433		4,255	
To archives	160		72		107		113		452	
To office use	153		153		234		124		664	
To branch offices	755		67		210		77		1,049	
To Coast Survey	136		116		160		132		544	
To home correspondents	67		85		44		77		273	
To foreign hydrographers	80		140		79		2		314	
To merchant vessels	20		36		23		17		96	
To miscellaneous	166		1,212		340		1,110		2,828	
Total	5,868		7,892		6,097		3,709		23,566	
Charts published	12		14		5		23		54	
Copies of charts condemned.	223		321		108		393		1,130	
Charts canceled	1		9		12		9		31	
Plans canceled.					1				1	
Copies of canceled charts condemned	26		364		1,534		761		2,075	

## BRITISH ADMIRALTY SECTION.

The system of accounts kept in the British Admiralty section of this division continues to work satisfactorily.

The following ships have received full outfits during the year:

*Bennington, Concord, Dolphin, Miantonomoh, and Monongahela*, for the North Atlantic.

*Atlanta, Bennington, Chicago, Newark, and Yantic*, for the South Atlantic. Those of the *Chicago, Atlanta, and Newark* have been ordered to be returned to this office.

The *Boston* and *Yorktown* for the Pacific.

The branch Hydrographic Office, San Francisco, received two Pacific outfits. The first was transferred to the *Adams* in March and a new one sent at once. This is kept up in the same manner as an outfit on board ship, and can be transferred to any vessel on the Pacific coast at once by telegraph from this office.

The *Petrel* and *Ranger* for the Asiatic.

A special Pacific outfit was issued to the following vessels during the Chinese trouble: *Philadelphia, Chicago, Atlanta, Newark, Bennington, Concord, Charleston, and Petrel*. The *Chicago* has returned her outfit to this office. The *Philadelphia, Atlanta, and Concord* have been directed to do the same. The *Charleston* transferred hers to the branch Hydro-

graphic Office, San Francisco. A partial European outfit was issued to the *Monongahela*, a special Bering Sea portfolio to the *Ranger*, and special outfits to the *Constellation*, *Cushing*, and *Passaic*.

*Statement of charts issued, received, corrected, etc., in the British Admiralty section for the years ending June 30, 1891, and June 30, 1892.*

	1890-1891.	1891-1892.
Charts received, British Admiralty:		
From J. D. Potter (Admiralty agent).....	3,579	6,528
From United States vessels (returned outfits).....	2,640	2,014
From B. F. Stevens (United States despatch agent):		
Sent to this office.....		750
Sent to United States vessels.....	411	506
From Admiralty Office (complimentaries).....	252	217
From miscellaneous sources.....	4	89
Total British Admiralty.....	6,886	10,194
Hydrographic Office received from Hydrographic Office section.....	7,919	8,019
Coast Survey received from Hydrographic Office section.....	5,335	3,049
Coast Survey, sent to United States vessels by U. S. Coast and Geodetic Survey Office.....		1,413
Total charts received in this office.....	20,140	22,625
Charts issued, British Admiralty:		
To United States vessels from this office.....	5,622	4,543
To United States vessels from B. F. Stevens.....	411	506
To archives.....	144	390
To divisions, etc.....	36	219
Total British Admiralty.....	6,213	5,748
Total Hydrographic Office.....	7,919	8,019
Total Coast Survey.....	5,335	4,462
Total charts issued from this office.....	19,467	18,229

British Admiralty charts on hand July 1, 1891.....	9,860	
British Admiralty charts received during year.....	9,598	
		19,458
British Admiralty charts issued during year.....	5,152	
British Admiralty charts condemned.....	770	
		5,922
British Admiralty charts on hand June 30, 1892.....		13,536

*Corrections made on British Admiralty charts.*

	1890-'91	1891-'92
From Notices to Mariners:		
Total standards affected by notices.....	1,200	1,028
Total number of charts corrected from notices.....	3,239	3,871
Total number of charts corrected by British Admiralty and other data.....	7,257	5,133

There have been 44 new British Admiralty charts received and placed on issue, 27 reissued, 45 canceled by British Admiralty and Hydrographic Office charts, 10 withdrawn from issue. The total number now issued to United States vessels is 2,039.

**DIVISION OF MARINE METEOROLOGY.**

This division was in charge of Lieut. H. M. Witzel, U. S. Navy, until June 21, 1892, the expiration of his term of shore duty, when he was relieved by Lieut. Commander E. W. Sturdy. The working force of this division is in point of numbers the same as at the beginning of the fiscal year. Lieut. Craven, transferred to the charge of the division of branch offices, was replaced by Mr. R. H. Orr from the division of sail-

ing directions, and Mr. J. M. Burlew, stenographer, who resigned in March, was succeeded in May by Mr. W. A. Marschalk.

The present force of this division is not sufficient to handle and fully utilize in all their phases the valuable amount of meteorological data annually received by the office, and it is hoped that during the coming year this defect may be remedied. For the present the work of this division is confined almost exclusively to the preparation and issue of the Monthly Pilot Charts and Weekly Bulletins, and the keeping up of a very extensive correspondence with observers and others on meteorological subjects. Under the direction of the chief of the division the preparation of the Pilot Chart has been conducted by Mr. Everett Hayden, assisted by Mr. T. S. O'Leary, Mr. R. L. Lerch, and Mr. R. H. Orr, and that of the Weekly Bulletins, by Mr. R. L. Lerch.

When it is considered that the world-wide reputation which the Pilot Chart has gained among those interested in marine matters, the appreciation of its accuracy and the acknowledged preëminence it holds as an aid to the navigation of the North Atlantic Ocean arises from the labor of so few persons, no higher praise can be awarded the gentlemen who perform this work than a simple statement of the fact.

The number of observers who send meteorological data to this office is now 2,525, an increase of nearly 500 in the past year. These reports come from merchant vessels of all nationalities, from our own and from foreign men of war, and from observers at coast and island stations extending from Newfoundland to St. Helena. From them are gathered the data for the Pilot Charts and Bulletins. That nothing of value to the mariner may be omitted requires practiced and conscientious work.

On each Pilot Chart is published special information which is pertinent to the season of the year. By this means a great deal of most useful information has been disseminated on the subject of hurricanes, the use of oil, the Gulf Stream, transatlantic routes, drift of ice, etc.

Supplements to accompany the Pilot Charts are also frequently published, giving detailed information with maps. The result of the work is that every sailing master leaving a port of the United States can have graphically before him as a guide in a North Atlantic voyage the very latest information regarding winds, fogs, ice, wrecks, derelicts, steamer routes, and currents.

As an aid to the investigation and increased knowledge of ocean currents the system of bottle papers has met with much success, and the returns of those papers to this office are growing to an extent that will speedily furnish sufficient data for trustworthy conclusions. These results will be of great value, as would those produced by the information regarding surface temperature.

The Bulletin, which is published Wednesday of each week, is for the benefit of mariners cruising along our own coast, and contains all the information of dangers to navigation, such as wrecks, derelicts, changes, etc., of which notice has been received from our branch offices and other sources during the week. These bulletins are printed at a nominal cost and sent to the branch offices, so that each office has a systematic record of the condition of the whole coast, and are able without omission or delay to place it in the hands of the mariner.

The issue of the Pilot Chart has been limited to 3,300 copies per month, due to the expense of the lithographic printing which has heretofore been done by contract; but the installation of our own lithographic press, which is now accomplished, will enable the office to increase the issue at the mere cost of the extra paper.

## DIVISION OF BRANCH OFFICES.

Lieut. John E. Craven assumed charge of this division on March 7, relieving Lieut. J. D. Adams, who was detached.

This division conducts the correspondence connected with the supervision of the branch offices; has charge of the mailing of current publications; all stationery and supplies for the office and its branches; all printing and binding, and the general executive duties of the office. Corrected lists are kept for the mailing of Pilot Charts, Bulletins, and Notices to Mariners. Account is taken of all printing and binding.

The following table shows the average number of regular publications mailed:

Monthly Pilot Charts .....	3,050
Weekly Bulletin .....	1,860
Notices to Mariners .....	1,080
Weekly Extracts (to branch offices).....	13,500

Very respectfully,

RICHARDSON CLOVER,  
*Lieutenant-Commander, U. S. Navy,*  
*Hydrographer to Bureau of Navigation.*

Commodore F. M. RAMSAY, U. S. Navy,  
*Chief of Bureau of Navigation.*

## E.

**ESTIMATES OF APPROPRIATION REQUIRED FOR THE SERVICE OF THE FISCAL YEAR  
ENDING JUNE 30, 1894, BY THE BUREAU OF NAVIGATION, NAVY DEPARTMENT.****FOR THE SUPPORT OF THE BUREAU OF NAVIGATION.**

## A.

*Salaries, Bureau of Navigation.*

One chief clerk (July 16, 1892).....	\$1,800.00
Four clerks of class 4 (July 16, 1892).....	7,200.00
Three clerks of class 3 (July 16, 1892).....	4,800.00
Three clerks of class 2 (July 16, 1892).....	4,200.00
Four clerks of class 1 (July 16, 1892).....	4,800.00
One clerk (July 16, 1892).....	1,000.00
One copyist (July 16, 1892).....	900.00
One copyist (July 16, 1892).....	720.00
One assistant messenger (July 16, 1892).....	720.00
Three laborers, at \$660 each (July 16, 1892).....	1,980.00
Three copyists, at \$900 each. (Submitted)*.....	2,700.00
<b>Total</b> .....	<b>30,820.00</b>

## B.

*I.—Salaries, Hydrographic Office.*

Two clerks of class 2. (Appropriated).....	2,800.00
One clerk of class 1. (Appropriated).....	1,200.00
One assistant messenger. (Appropriated).....	720.00
One watchman. (Appropriated).....	720.00
Draftsmen, engravers, assistants, nautical experts, computers, custodian of archives, copyists, copper-plate printers, printers' apprentices, and laborers in the Hydrographic Office. (Appropriated).....	40,000.00
<b>Total</b> .....	<b>45,440.00</b>

*II.—Contingent and miscellaneous expenses, Hydrographic Office.*

Purchase of copper plates, steel plates, chart paper, electrotyping copper plates, cleaning copper plates; tools, instruments, and materials for drawing, engraving, and printing; materials for and mounting charts, data for charts and sailing directions, reduction of charts by photogra- phy, photolithographing charts for immediate use, transfer of photolith- ographic and other charts to copper; care and repairs to printing presses, furniture, instruments and tools; extra drawing and engraving, trans- lating from foreign languages; expert marine, meteorological, and other work in the preparation of the Pilot Chart and supplements, and the printing and mailing of the same; and purchase of, compiling, and ar- ranging data for charts and sailing directions, and other nautical pub- lications; works and periodicals relating to hydrography, marine me- tology, navigation, and surveying. (Appropriated).....	31,000.00
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- \* T work of the Bureau has increased so much during the past two years  
able to carry on the current work and keep up the records with the  
w allowed. An increase of three copyists is absolutely necessary.

Rent of building for printing presses, draftsmen and engravers, storage of copper plates, and materials used in the construction and printing of charts; repairs and heating of the same, and for gas, water, and telephone rates. (Appropriated) .....	\$1, 500.00
Contingent expenses of branch offices at Boston, New York, Philadelphia, Baltimore, Norfolk, Savannah, New Orleans, San Francisco, Portland (Oregon), Portland (Maine), Chicago, and Port Townsend, including furniture, fuel, lights, rent and care of offices, car fare and ferrriage in visiting merchant vessels; freight, express, telegrams, and other necessary expenses incurred in collecting the latest information for the Pilot Chart, and for other purposes for which the offices were established, including \$1,000 for rent of office in New York. (Appropriated) .....	18, 800.00
<b>Total</b> .....	<b>51, 300.00</b>

## FOR THE NAVAL SERVICE.

I.—*Gunnery exercises.*

For prizes for excellence in gunnery exercises and target practice, diagrams and reports of target practice for the establishment and maintenance of targets and ranges, for hiring established ranges, and for transportation to and from ranges. (Appropriated) .....	6, 000.00
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II.—*Ocean and lake surveys.*

For ocean and lake surveys, the publication and care of the results thereof; the purchase of nautical books, charts, and sailing directions, and freight and express charges on same; preparing and engraving on copper plates the surveys of the Mexican coasts, and the publication of a series of charts of the coast of Central and South America. (Appropriated) .....	14, 000.00
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III.—*Outfits for naval apprentices.*

For bounties for outfits of 750 naval apprentices, at \$45 each. (Appropriated) .....	33, 750.00
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IV.—*Transportation, recruiting, and contingent, Navigation.*

For expenses of recruiting for the naval service, rent of rendezvous and expenses of maintaining the same, advertising for men and boys; printing and all other expenses attending the naval service, and for the transportation of enlisted men and boys at home and abroad; for heating apparatus for receiving and training ships, and extra expenses thereof; for freight, telegraphing on public business, postage on letters sent abroad; ferrriage, ice, apprehension of deserters and stragglers, continuous service certificates, discharges, good-conduct badges, and medals for boys; books, stationery, educational appliances and musical instruments for training ships; packing boxes and materials, and other contingent expenses and emergencies arising under cognizance of the Bureau of Navigation, unforeseen and impossible to classify. (Appropriated)* .....	56, 000.00
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V.—*Naval training station.*

For dredging channels; repairs to main causeway, roads, and grounds; extending sea wall, and the employment of such labor as may be necessary for the proper care and preservation of the same; for repairs to wharf and sea wall; for repairs and improvements on buildings; heating, lighting, and furniture for same; books and stationery; freight and other contingent expenses; purchase of food and maintenance of wagon and attendance on same. (Appropriated) .....	30, 000.00
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\* This increase of appropriation is asked in order that enlisted men in the Navy may be transported to and from the Pacific coast by rail. The Pacific Mail Steamship Company frequently refuses to carry enlisted men from New York to San Francisco. On the 17th of August, 1892, the treasurer of the company at New York informed the Department that the company carried men only as a favor to the Government.

For building the retaining wall from material on the island at \$5 per foot, and foundation. Submitted	\$2,500.00
For two boilers and extension of boiler house, with water tank and feed water tank. Submitted	7,000.00
For purchase of one dynamo, 50 horse power, and extension of electric plant for "Training station" and "War college and torpedo school." (Submitted)	4,500.00
For a building to quarter 432 apprentices, comprising dormitory, mess and formation and drill halls, wash, bath, and drying rooms, library and offices, store-house, reading and recitation rooms, to be heated by steam and lighted by electricity, and with water-tank in tower, with drainage to tidal current of the bay, with cook and coal houses. Submitted	225,000.00
<b>Total</b>	<b>239,000.00</b>

#### VI.—*Naval war college and torpedo school.*

For maintenance of the naval war college and torpedo school on Coasters Harbor Island, and care of grounds for same. (Appropriated)	10,000.00
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#### VII.—*U. S. Naval Academy—Pay of professors and others.*

For one professor of mathematics, one of chemistry, and one of physics, at \$2,500 each. (Appropriated)	7,500.00
For two professors (assistants), namely, one of French and Spanish, and one of English studies, history and law, at \$2,200 each. (Appropriated)	4,400.00
For five assistant professors, namely, one of English studies, history and law, three of French, and one of drawing, at \$1,800 each. (Appropriated)	9,000.00
For one sword master, at \$1,500, and two assistants, at \$1,000 each. (Appropriated)	3,500.00
For one boxing master and gymnast. (Appropriated)	1,200.00
For one assistant librarian. (Appropriated)	1,400.00
For one secretary of the Naval Academy. (Appropriated)	1,800.00
For two clerks to Superintendent, at \$1,200 and \$1,000, respectively. (Appropriated)	2,200.00
For one clerk to the commandant of cadets. (Appropriated)	1,200.00
One clerk to paymaster. (Appropriated)	1,200.00
One dentist. (Appropriated)	1,600.00
One baker. (Appropriated)	600.00
One mechanic in department of physics and chemistry. (Appropriated)	730.00
One cook. (Appropriated)	325.50
One messenger to Superintendent. (Appropriated)	600.00
One armorer. (Appropriated)	649.50
One chief gunner's mate. (Appropriated)	529.50
One quarter gunner. (Appropriated)	433.50
One cockswain. (Appropriated)	469.50
One seaman in department of seamanship. (Appropriated)	397.50
One attendant in department of astronomy and one in department of physics and chemistry, at \$300 each. (Appropriated)	600.00
Six attendants at recitation rooms, library, store, chapel, and offices, at \$300 each. (Appropriated)	1,800.00
One band master. (Appropriated)	528.00
Twenty-one first-class musicians, at \$348 each. (Appropriated)	7,308.00
Seven second-class musicians, at \$300 each. (Appropriated)	2,100.00
Services of organist at chapel. (Appropriated)	300.00
Increase of pay of one clerk in Superintendent's office.† (Submitted)	200.00

\* The building which has been used at the training station for quarters for apprentices since the withdrawal of the *New Hampshire* on account of her unsanitary condition, is most unsuitable. It was built to be used as a gymnasium and drill hall. There are frequently 400 apprentices at the station, and with present buildings no suitable arrangements can be made for their sleeping, messing, cleanliness or instruction. A building for their accommodation is absolutely necessary from a sanitary standpoint.

† Increase of pay asked for because his present rate of pay is not believed to be commensurate with the duties of his office, which are arduous and important.



Increase of pay of quarter gunner, to amount allowed by law. (Submitted)* .....	\$36.00
Increase of pay of 20 per cent on \$528, pay of band master. (Submitted)† .....	105.60
Increase of 20 per cent on \$348, each, pay of twenty-one first-class musicians, \$69.60 each.† (Submitted).....	1,461.60
Increase of 20 per cent on \$300, each, pay of seven second-class musicians, \$60 each.† (Submitted).....	420.00
For one bookbinder for Naval Academy, \$600.‡ (Submitted) .....	600.00
For pay of one electrician at Naval Academy.§ (Submitted).....	900.00
For pay of one printer at Naval Academy.   (Submitted) .....	700.00
<b>Total</b> .....	<b>56,794.20</b>

*Special course of study.*

For special course of study and training of naval cadets, as authorized by act of Congress approved August 5, 1882. (Appropriated) .....	5,000.00
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*For pay of watchmen, mechanics, and others.*

For captain of the watch and weigher, at \$2.50 per diem. (Appropriated).....	912.50
For four watchmen, at \$2 per diem. (Appropriated).....	2,920.00
For foreman of gas and steam-heating works of Academy, at \$5 per day. (Appropriated) .....	1,825.00
For labor at gas works and steam buildings, for masons, carpenters, and other mechanics and laborers, and for care of buildings, grounds, wharves, and boats. (Appropriated) .....	37,864.95
For one attendant in purifying house of gas house, at \$1.50 per diem. (Appropriated) .....	547.50
<b>Total</b> .....	<b>44,069.95</b>

*For pay of steam employes, Naval Academy.*

For pay of mechanics and others in department of steam engineering. (Appropriated) .....	7,824.50
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*For repairs and improvements, Naval Academy.*

For necessary repairs of public buildings, pavements, wharves, and walls, inclosing the grounds of the Naval Academy; improvements, repairs, furniture, and fixtures. (Appropriated).....	21,000.00
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*For quarters for officers and instructors, U. S. Naval Academy.*

For quarters for eight officers and instructors, four double houses, at \$15,000 each.   (Submitted, to be immediately available) .....	60,000.00
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\* Increase asked in order that his pay may be made equal to that of a quarter gunner in general service. His present pay was that given to such quarter gunner before the last increase.

† An increase of pay for all bandmen is asked because it is believed that good men can earn more elsewhere than the present rate of pay, and as much as is asked for. If continued on the present rate of pay it is feared that the best will go, leaving only the indifferent musicians.

‡ The amount of bookbinding done at the Academy justifies the establishment of this position.

§ The position of electrician at \$900 is recommended because of the amount of work necessary to keep electrical apparatus in the several departments in proper working condition. The nature of the work requires a skilled mechanic whose services are fully worth the amount asked for.

|| The amount of printing done at the Academy justifies the establishment of this position.

¶ At no time have the quarters been adequate for the accommodation of all the officers attached to the Academy, and all the hardships of renting comes upon the juniors, who can least afford the expense

# BUREAU OF NAVIGATION.

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## For new boiler house.

For one new boiler house and fittings.\* (Submitted, to be immediately available) .....\$26,000.00

## Heating and lighting Naval Academy.

For fuel and for heating and lighting Academy and school ships. (Appropriated)..... 17,000.00

## Contingent and miscellaneous expenses.

For purchase of books for library. (Appropriated) ..... 2,000.00  
 For stationery, blank books, models, maps, and text-books for use of instructors. (Appropriated)..... 2,000.00  
 For expenses of Board of Visitors to Naval Academy; being mileage, and \$5 per diem for each member, for expenses during actual attendance at the Academy. (Appropriated)..... 1,500.00  
 For purchase of chemicals, apparatus, and instruments in department of physics and chemistry, and for repairs of same. (Appropriated)..... 2,500.00  
 For purchase of gas and steam machinery, steam pipe and fittings; rent of buildings for use of the Academy; freight, cartage, water, music, musical and astronomical instruments; uniforms for the bandmen, telegraphing, feed and maintenance of teams, current expenses and repairs of all kinds, and for incidental labor and expenses not applicable to any other appropriation. (Appropriated) ..... 32,000.00  
 For stores in department of steam engineering. (Appropriated)..... 800.00  
 For materials for repairs in steam machinery. (Appropriated)..... 1,000.00  
 Total ..... 41,800.00

## RECAPITULATION.

### NAVAL ACADEMY.

For pay of professors and others ..... 56,794.20  
 For special course of study ..... 5,000.00  
 For pay of watchmen and others ..... 44,069.95  
 For pay of steam employes ..... 7,824.50  
 For repairs and improvements ..... 21,000.00  
 For quarters for officers and instructors ..... 60,000.00  
 For one new boiler house ..... 26,000.00  
 For heating and lighting Naval Academy ..... 17,000.00  
 For contingent and miscellaneous expenses ..... 41,800.00  
 Total ..... 279,488.65

## FOR THE SUPPORT OF THE BUREAU OF NAVIGATION.

A.—I. Salaries, Bureau of Navigation ..... 30,820.00  
 B.—I. Salaries, Hydrographic Office ..... 45,440.00  
 B.—II. Contingent and miscellaneous expenses, Hydrographic Office ... 51,300.00  
 Total ..... 127,560.00

## FOR THE NAVAL SERVICE.

I. Gunnery exercise ..... 6,000.00  
 II. Ocean and lake survey ..... 14,000.00  
 III. Outfits for naval apprentices ..... 33,750.00  
 IV. Transportation, recruiting and contingent navigation ..... 56,000.00  
 V. Naval training station ..... 269,000.00  
 VI. Naval war college and torpedo school ..... 10,000.00  
 VII. Naval Academy ..... 279,488.65  
 Total ..... 668,238.65

\*The heating arrangements are inadequate for the present needs and are inconveniently located. At present there are two boiler houses, widely separated, each requiring the attendance which would suffice for one, and thereby causing additional expense of maintenance. The boilers have been in use from twenty to four years, and must soon be replaced. The buildings in which they are would require material alterations and additions if modern boilers were put in. It would be true economy to provide a suitable building now.

SCHEDULE OF BIDS RECEIVED AND CONTRACTS MADE DURING THE FISCAL YEAR  
ENDING JUNE 30, 1892.

*For the construction of two brick double houses at the Naval Academy, Annapolis, Md.,  
under advertisement May 4, 1891.*

	Plans C D.	Plans A B.	Plans A B modified.
James R. Walter* .....	*\$19,282.88	\$18,227.34	\$16,483.00
Halliday & Richardson .....			17,800.00
Columbus Thomas† .....	10,584.00	9,635.00	19,856.00
W. R. Coon .....	22,326.00	19,480.00	17,980.00

\* Accepted plans C and D.

† Bid under misapprehension.

*For the construction of a building for the Naval Torpedo Station and War College on  
Coasters Harbor Island, Newport Harbor, Rhode Island, under advertisement July 29,  
1891.*

Lyman D. Willcutt .....	\$106,176	Michael A. McCormick .....	\$108,700
William J. Underwood .....	111,000	Beattie & Wilcox .....	89,323
Norcross Brothers .....	89,500	Ashton S. Tourison* .....	82,875
J. E. & A. L. Pennock .....	99,691		

\* Accepted.

*For furnishing and supplying a steam-heating apparatus for the Naval Torpedo Station and  
War College, Coasters Harbor Island, under advertisement, August 7, 1891.*

Baker, Smith & Co .....	\$6,148
Charles G. Cunningham .....	4,200
Walworth Construction and Supply Company* .....	2,837
E. Rutzler .....	6,000

*For furnishing an additional water supply with plant for the use of the Naval War College  
and Torpedo School, under advertisement, March 15, 1892.*

Delbert L. Barker* .....	\$5,822
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*For grading and roadway on the grounds of the Naval War College and Torpedo School,  
Coasters Harbor Island, under advertisement, March 16, 1892.*

William H. Mague .....	\$2,925
James Corrigan* .....	2,244
Jere K. Sullivan .....	2,675

\* Accepted.

# ANNUAL REPORT

## OF THE

### CHIEF OF THE BUREAU OF ORDNANCE.

BUREAU OF ORDNANCE,  
NAVY DEPARTMENT,  
*Washington City, November 5th, 1892.*

**SIR:** I have the honor to submit the annual report of this Bureau, and also to transmit estimates for the fiscal year ending June 30, 1894, viz:

(1) Fuel, tools, material, and labor; expenses of target practice, maintenance of new proving ground, and proof of naval armaments.....	\$280,000
(2) General repairs to ordnance buildings, machinery, magazines, and appendages.....	30,000
(3) Freight and miscellaneous expenses.....	10,000
(4) Arming and equipping naval militia.....	50,000
(5) Civil establishment at navy yards.....	29,324
(6) General expenses of the torpedo station.....	60,000
(7) Towards the armament of vessels authorized.....	2,000,000
<b>Total.....</b>	<b>2,459,324</b>

#### BREECH-LOADING RIFLES.

The general system of construction remains unchanged, but the increase of stiffness and strength along the chase demanded by the increasing length of guns and the use of the new powders has caused some modifications in the design, especially of the heavier calibers, and will probably require still further modification in the same direction in the future.

The following table shows the status of the guns required to arm the 7 vessels authorized by law:

Caliber of gun.	Completed at date of last report.	Completed at this date.	Partly completed.	Afloat.	Total required.
13-inch.....	7	35	32	2	74
12-inch.....	3	14	31	2	68
11-inch.....	117	135	0	90	126
10-inch.....	19	23	12	14	67
9-inch.....	8	25	0	6	22
8-inch.....	1	5	1	2	12
7-inch.....	0	0	1	0	12
<b>Total.....</b>	<b>155</b>	<b>237</b>	<b>77</b>	<b>116</b>	<b>381</b>

381 guns, of calibers from 4 to 13 inches required, 237 have been completed and 116 are already afloat.

13-inch gun is approaching completion and the forgings have been received.

Five 12-inch guns have been completed, of which 2 have been proved and are being installed on the *Monterey*. The test of this caliber upon the firing ground was entirely satisfactory.

All the 10-inch guns required have been completed and are ready for installation on the ships to which this caliber has been assigned.

A marked step in advance has been made in the application to the 10-inch and 12-inch guns of a device for operating their breech closure by hand. After considerable trial and experiment a simple and efficient mechanism has been developed, and thereby not only is the rapidity of fire of these heavy guns considerably increased, but the apparatus for working them is much simplified. The serious disadvantages attending the use of power, whether hydraulic, electric, or other, in the working of naval ordnance are now generally recognized, and, as far as is practicable, the Bureau proposes to use hand power for operating heavy guns.

The forgings for an 8-inch gun of special design, to be assembled by a means proposed by Mr. William Sellers, of Philadelphia, Pa., have been ordered from the Bethlehem Iron Company. This gun is composed of only three principal parts—a tube, an inner jacket, and an outer jacket—and it is claimed that the expense of manufacture will thus be reduced. It is also intended, with the apparatus proposed and invented by Mr. William Sellers, that a gun may be dismounted after considerable service and that an eroded or damaged tube may be replaced by a new one. This apparatus and method appears to give promise of a definite step in advance in our methods of construction. The forgings for this experimental piece are to be of nickel steel, the physical qualities of which are from 10 to 15 per cent higher than those of ordinary gun steel, and should this experimental gun prove a success, and there is little room for doubt that it will so prove, it is probable that the Bureau will adopt nickel steel as the material for future gun construction.

The metallic cartridge cases now adopted for the 4-inch, 5-inch, and 6-inch calibers will probably before long be applied to the larger calibers as well. The Bureau is convinced that it is merely a question of time before this innovation will be a definitely recognized necessity in the military services of all nations. The advantages of doing away with the obturator, of eliminating sponging, of replacing present powder tanks in the magazines by cartridge cases as fixed ammunition, and the increase in rapidity of fire are too obvious to need discussion.

All the 6-inch guns required to arm ships building or authorized have been completed, but the Bureau has contracted for forgings for six 6-inch guns of 40 calibers length of bore, which it proposes to make rapid-fire guns, using brass cartridge cases similar to those of the 4-inch and 5-inch rapid-fire guns. These will be supplied to certain of the fast cruising vessels.

The adoption of the rapid-fire type of breech mechanism for the later 6-inch guns, even without the use of the brass cartridge case, has resulted in a marked increase in their rapidity of fire, 10 rounds having been fired in two minutes and fifty-seven seconds with this mechanism, while five minutes and one second were required for the same number of rounds with the ordinary service type.

During the year the first 5-inch cartridge cases were submitted, and the Bureau was enabled to give a thorough test to the 5-inch rapid-fire guns with most satisfactory results. A rapidity of fire of 5 shots in nineteen seconds was attained, and the gun, breech mechanism, and cartridge cases functioned well. There will be no delay in supplying these guns and their ammunition to ships as needed.

In testing cartridge cases, and in carrying on various experiments, a large number of rounds have been fired from 4-inch rapid-fire guns, 35 of which have now been completed. One of these guns has been fired 250 rounds without showing any signs of deterioration other than a slight erosion near the seat of the projectile. A rapidity of fire of 5 rounds in fourteen seconds has been attained with this gun, and an idea of what this means can be formed from the fact that at an elevation of 10°, corresponding to about 6,000 yards range, five shells can be kept in the air together.

The following table shows the present condition of the work upon the secondary-battery guns:

Gun.	Kind.	No. ordered.	No. completed.	No. afloat.
37-millimeter	Hotchkiss	77	77	61
47-millimeter R. C.	do	18	18	12
1-pounder	Hotchkiss	68	44	22
	Driggs-Schroeder	15		
2-pounder	Hotchkiss	38	38	33
	Driggs-Schroeder	10		
6-pounder	Hotchkiss	152	104	87
	Driggs-Schroeder	115	10	3

The 37 mm. and 47 mm. R. C. are considered inferior to the single-barrel guns of same caliber, and no more of them will be ordered.

Of the 1-pounders sixty-five are long and high-powered guns, and the eighteen short guns will probably eventually be withdrawn from service to prevent complication in the ammunition supply. All the 3-pounders are high-power guns, but no more of this caliber will be ordered, as the greater simplicity of armament resulting from the use of only 1-pounder and 6-pounder guns is considered very desirable.

Of the 6-pounders one hundred and fifty are five calibers longer than the rest and have about 100 feet-seconds greater velocity, but the ammunition used is the same, and consequently no difficulty will arise from the difference in the guns.

#### POWDER.

The manufacture of brown powder for the Navy has been continued by Messrs. E. I. Du Pont & Co., of Wilmington, Del. No changes in the requirements for the powder have been made, 2,000 feet-seconds, 2,100 feet-seconds, and 2,175 feet-seconds, respectively, being demanded for guns of 30, 35, and 40 calibers length of bore, the maximum pressure in no case to exceed 15 tons per square inch. With these requirements powder is supplied without difficulty for the guns of 8-inch caliber and less, and for 10-inch guns enough powder has been accepted by supply ships completed, but as yet no entirely satisfactory 12-inch gun has been tested. The difficulty would undoubtedly be removed by allowing an increase of pressure to 17 tons, and this is the usual road, but the Bureau prefers not to do this on account of the probable increase of the gun's life which will result from the use of moderate pressures; and it is thought that finally powder up to 21,000 feet-seconds will be supplied for the larger calibers with as uniformness as it already is for the smaller.

Black powder is still used in the 4-inch and 5-inch rapid-fire guns, and in the near future it will probably be replaced by smokeless

A special-sized grain is required to fit the 5-inch cartridge

case, and, this gun being adapted to a charge of half the weight of the projectile, the specifications for the 5-inch powder have been fixed at 2,300 feet-seconds muzzle velocity with a maximum pressure of 15 tons.

In the 4-inch gun the same grain is used as in the 6-inch and larger guns, and the requirement is only 2,000 feet-seconds, owing to the small weight of charge adopted.

For the 3-pounders and 6-pounders a cubical-grained black powder is used, and for the short 1-pounder guns an irregular small-grain black powder. The long 1-pounders will be temporarily supplied, pending the manufacture on a large scale of smokeless powder, with a cubical-grain black powder, giving 1,800 feet-seconds with a maximum pressure of 13 tons.

An important step has been taken by the Bureau during the year in inducing the California Powder Company, of Santa Cruz, Cal., to undertake the manufacture of brown powder for the Navy. This company has made hexagonal and sphero-hexagonal black powder for both the War and Navy Departments in past years, but an agreement has now been reached whereby it has been furnished by the Messrs. Du Pont with the results of the latter's experience in making brown powder, and there is little doubt that it will soon succeed in duplicating the Du Ponts' work. To aid in this development the Bureau has installed at the company's works a 6-inch gun and mount and chronographs for measuring velocities. It is thought that the establishment of the manufacture of brown powder on the Pacific Coast is a most important step in advance.

#### STOWAGE OF MAGAZINES AND THE SUPPLY OF AMMUNITION ON BOARD SHIPS.

Special attention has been given to the arrangement and stowage of ammunition on board vessels now in course of construction, so that every group of guns shall be provided, as far as practicable, with its own independent supply.

A uniform system of stowage for every class of ammunition has been practically settled. The aim has been to combine compactness and accessibility. The stowage dimensions of packing cases have been made as small as is consistent with safe stowage. Such magazine fittings as must be at all times accessible have been grouped together where practicable, thus saving valuable space for stowage which would otherwise be left free for passage of men to them.

All classes of ammunition for the Navy are so packed that in no case is it necessary ever to open a tank of powder or package of rapid-fire ammunition in the magazines, the powder being carried to the point of loading in its stowage tank, where the seal is broken for the first time, all rapid-fire ammunition being protected by wooden cases until the moment it is required for use in the gun. The advantage of such a system, in view of the recent experience on board the *Philadelphia*, is obvious.

Mechanical hoists for supplying ammunition to 8-inch and 6-inch B. L. R., 4-inch and 5-inch rapid-fire, mounted on central-pivot carriages, have been developed.

These hoists will be operated by steam, electricity, or hand power, as the circumstances of the case may require.

Steam will be used where available and the work to be done is too fatiguing for hand power. In places where steam is not available elec-

tricity will be used. In all cases the machines for hoisting have been located below the protective deck.

The details of this most intricate and difficult subject have been very successfully and creditably solved by Lieut. C. J. Boush, of this Bureau.

#### SMOKELESS POWDER (M. N.).

Since the last report marked progress has been made in the development of the Navy smokeless powder. At that date tests had been made only in small arms, 3-pounders, and 6-pounders, and once in the 4-inch rapid-fire gun. During the past year 1,500 pounds of smokeless powder, made at the torpedo station at Newport, have been tested in various ways with most gratifying results.

The square, flat grains first used have been given up and the macaroni form adopted, the diameter of the sticks varying from about one thirty-second of an inch for the small arms to about two-tenths of an inch for the 6-inch gun, and the larger sticks being perforated. Repeated experiments have further demonstrated the stability and safety of this powder. One portion placed in an iron vessel, wrapped in felt, and exposed to a temperature of 208° F. for six hours was absolutely unaffected; another, similarly treated, stood a temperature of 212° F. for twenty hours before showing signs of change; a third sample exposed to a temperature 5 degrees below zero F. was likewise unaffected. Attempts to detonate this powder by the service detonator, when closely confined in iron cylinders, have failed, though the cylinders themselves were ruptured and the powder scattered.

The reported fact that nitro-glycerin powders disintegrate at temperatures below the freezing point of nitro-glycerin, about 39° F., and the fact that nitro-glycerin is volatile at all temperatures, the rate of evaporation increasing with the temperature, when considered in connection with the above experiments with a gun-cotton powder, are convincing proof of the latter's superiority.

A quantity of this powder for the 6-inch rapid-fire caliber, stored during a period of six months at the proving ground, Indian Head, Maryland, passing through the exceedingly hot weather of the summer of 1892, showed no change in the firing test.

The best results thus far obtained with the Navy smokeless powder are as follows:

	Charge.	Muzzle velocity.	Pressure.
	Pounds.	Ft. sec.	Tons.
h rapid-fire gun, 33-pound shell, M. N. 2 powder .....	4.05	1,912	10.3
	4.40	1,936	11
	4.80	1,990	12
	5.20	2,125	14.7
	5.20	2,134	14.8
	5.30	2,145	14.8
	5.30	2,160	15
	5.30	2,158	14.8
	11	2,108	10
	12	2,256	12
ch rapid-fire gun, 50-pound shell, M. N. 3 powder .....	12.75	2,383	13.2
	13.12	2,474	14.2
	13.12	2,432	14.1
	13.40	2,578	15.6
	15	1,535	5.1
L. R. of 40 calibers, 100-pound shell, M. N. 6 powder .....	19	1,793	7.3
	23	2,151	11.2
	25	2,369	12.6
	26	2,469	13.9
	26	2,456	13.9



A comparison of these results with those published as obtained abroad (giving due weight to the different lengths of bore and weights of projectile) shows the marked superiority of the American smokeless powder, which gives higher and more regular velocities with much lower and much more uniform pressures.

There is every reason to believe that in the near future smokeless powder will take the place of ordinary gunpowder in the smaller guns, and that its use will gradually be extended to the largest calibers. The Bureau expects to soon have the manufacture of this explosive upon a large scale under way, and will then issue it to service for all classes of rapid-fire guns.

As regards powder for small arms progress has not been as great as has been anticipated. The difficulties of securing ignition and perfect combustion of a form of powder admitting machine loading of the cartridges have not yet been overcome. The use of the small macaroni form of grain with the method of ignition found necessary would make machine loading impracticable, and the square grain, more easily ignited and loaded, from its irregular packing in the cartridge case, gives correspondingly irregular results in velocity and pressure. Experiments are, however, being continued with small-arm powder at the torpedo station, and the Bureau has no doubt that all difficulties will soon be overcome. As the Department is aware, the same difficulties in the way of the successful development of a suitable smokeless powder for small arms are reported from every quarter abroad.

#### HIGH EXPLOSIVES.

The plant for the manufacture of gun cotton being established by Messrs. E. I. Du Pont & Co. has been completed and 20,000 pounds of the 50,000 pounds ordered have been made and accepted by the Bureau.

During the year, 27,551 pounds of gun cotton were manufactured at the torpedo station at Newport, of which 10,172 pounds were molded in solid blocks for charges for the pneumatic guns of the *Vesuvius* and 1,913 pounds were used in making smokeless powder. In January last 12,000 pounds of gun cotton and 100 loaded torpedoes were shipped by the Bureau to the Mare Island navy-yard, to be used in defending the port if necessary. The capacity of the torpedo-station plant is now estimated at 64,000 pounds of dry gun cotton per year of 300 working days.

Tests with emmensite have continued. Samples filled into shells and others in tin cases have been examined monthly since June, 1890, and no change has been observed to take place. Shell of different caliber filled with emmensite have been burst in the explosion chamber and under water, and it has been conclusively demonstrated that an explosion of a high order can be obtained from this material by the use of a simple fuse, perfectly safe to fire, not containing fulminate, and requiring only a percussion cap to ignite it.

The XI-inch mortar, manufactured from an XI-inch cast-iron smooth-bore gun, and referred to in the last report, was used for firing shell charged with emmensite, and much valuable information gained therefrom prior to its destruction by too large a charge of powder. It was mounted for firing over the range and unfused cast-iron shell containing 42 pounds of emmensite were fired from it with a charge of 40 pounds brown powder. On firing the fifth round the gun burst, its walls breaking into very large pieces with a fracture of inferior appearance. The shell also broke into large fragments. The emmensite, however, *did not explode*, but was scattered in all directions, very

little being burned. The circumstances of the explosion were such as to exclude the possibility of its being due to the emmensite, and the Bureau is satisfied that upon the completion of a reliable steel gun complete success will be attained in its object of firing a high explosive from a powder gun with a fairly flat trajectory and bursting it detonatively on impact.

To justify these conclusions the tests of emmensite were then continued with a 6-inch wire-wound gun available for such experiments, and shell filled with emmensite have been fired from this gun with the service velocity of 2,000 feet-seconds and exploded upon impact with the water at a range of about 6,000 yards.

The Bureau further caused to be fired 25 rounds from this gun at velocities of about 1,500 feet-seconds, using shell charged with emmensite. These experiments were made without accident or abnormal or disadvantageous feature of any description whatsoever.

During the past year the Bureau has also developed a high explosive at the torpedo station which may be utilized as the bursting charges of common shell, aerial torpedoes, submarine torpedoes, etc., on account of the safety with which it may be handled and of the possibility of exploding it detonatively, without the use of fulminate of mercury. In course of experiments with this explosive a number of rounds were fired from the 4-inch rapid-fire gun with the service velocity of upwards of 2,000 feet-seconds. Other experiments have shown that common shell, of the tubular manufacture, filled with this explosive, can be fired through six 1-inch plates and burst detonatively at will beyond them. As a bursting charge for the same shell, when fired in the explosion chamber, the production of fragments was entirely satisfactory as regards number and size.

It is believed that these very successful experiments in the utilization of a high explosive of great power as a bursting charge for shell propelled by gunpowder with high velocities settle the long discussion in this country with regard to the relative merits of firing high explosives from air guns or from powder guns.

It is appreciated (and this has likewise been noted abroad) that a decided revolution in the character of the armament of vessels of war is imminent. The batteries of naval vessels will be composed of two classes of guns; the first, as at present, of great length and power, using armor-piercing projectiles, and the second, shorter guns of very large bore and firing projectiles containing charges of powerful high explosives, the latter being intended for use against the unarmored portions of ships.

#### ARMOR-PIERCING PROJECTILES.

A second contract for armor-piercing shell of 6-inch and 8-inch caliber has been entered into with the Carpenter Steel Company, of Reading, Pa. In this contract the severity of the acceptance test was considerably increased. The size of the lots of projectiles was also largely increased, thereby reducing the cost of testing, which is a large item. This company has already furnished the Bureau with 1,025 6-inch, 343 8-inch, and 37 10-inch armor-piercing shell, and the acceptance tests of these shell and their use during the last year in armor trials, side by side with foreign shell made by Firth and Holtzer, have further demonstrated their excellent quality.

As noted in the report of the Inspector of Ordnance in charge of the Ring Ground, Indian Head, Maryland, the Carpenter projectiles have definite features of superiority as compared with those manufactured by Firth and Holtzer, tested with the same plates.

The Sterling Steel Company, of Delmar, Pa., after several unsuccessful attempts, finally presented for test a 6-inch armor-piercing shell which came up to the Bureau's requirements, and an order for 100 of these shell, subsequently given to that company with the same specifications as are attached to the Carpenter contract, has been filled. There is no doubt that the successful manufacture of the higher calibers of armor-piercing shell by this company will follow, and another source of supply for a war material so necessary and yet so slow and difficult of production is thus assured. In order to further definitely establish the advantages and presumed superiority of the American manufacture of armor-piercing projectiles, the Bureau at recent date again caused to be made at the proving ground, Indian Head, Md., a comparative test of the 8-inch caliber, using two specimens each of the Holtzer, Carpenter, and Sterling product. In this test the Carpenter shell were clearly equal to if not superior to the best of the Holtzer manufacture thus far delivered in this country. One of the Sterling projectiles showed qualities of very superior character. The Bureau will, in future contracts, demand a more severe reception test than is required abroad for armor-piercing projectiles.

The manufacture of armor-piercing shell for the 3-pounder and 6-pounder rapid-fire guns appears finally to have been established on a satisfactory basis. The Bureau's requirements for these shell are very severe, since they must not only pass through 3-inch and 4-inch wrought-iron plates, respectively, without distortion or cracks, but must also, on being burst, break into a large number of pieces. After long experimentation the three companies engaged in their manufacture—the Hotchkiss Ordnance Company, the Driggs Ordnance Company, and the American Projectile Company—have succeeded in overcoming these difficulties and are supplying shell fully up to requirements.

In January last the Department deemed it desirable to supply certain ships with armor-piercing shell at once, and accordingly 200 6-inch, 200 8-inch, and 60 12-inch Holtzer shell, and 100 Firth 10-inch armor-piercing shell were ordered from abroad. Prior to this 50 6-inch, 50 8-inch, 15 10-inch, and 15 12-inch Holtzer shell had been ordered for experimental purposes. All these shell have been received.

The great expense of forged-steel armor-piercing shell and the necessity for their extensive use in war time have induced the Bureau to develop a cast-steel shot which, though inferior in quality, might, nevertheless, on account of cheapness and facility of production, in part fulfill their function. To this end the Bureau placed an order with I. G. Johnson & Co., of Spuyten Duyvil, New York City, for 400 10-inch and 100 12-inch cast-steel shot, the acceptance test being that a selected shot from each lot should go through a steel plate 1 caliber thick when fired with service velocity. In August last a sample shot of each caliber was tested by firing against a 13-inch plate made by Carnegie, Phipps, & Co., and one of the two, which had been oil-tempered, did well enough to encourage further experiment in this direction, while the other, which was untreated, proved of no value. It is hoped before long more satisfactory results will be attained.

#### COMMON SHELL.

All cast-iron projectiles for the Navy, except those for the small rapid-fire guns, are made at the Washington navy-yard. During the year about 12,000 shells of calibers from 4 to 13 inches have been manufactured.

The forged-steel common shell and shrapnel cases contracted for

with the U. S. Projectile Company of Brooklyn, N. Y., and made by the Caley-Courtman process, have all been supplied. These shells have proved most satisfactory in the tests, and a further contract has been entered into by the Department for 16,000 4-inch, 10,000 5-inch, and 10,000 6-inch. This company will shortly extend this process to the 8-inch caliber.

The 6-pounder and 4-inch steel shell made for the Bureau by the American Projectile Company of Lynn, Mass., have also proved to be of excellent quality. These shells are made by electrically welding drawn-steel tubing to drop-forged heads, and the process has now been extended to 6-inch shell, of which the Bureau has ordered 2,000.

Cast-steel common shell, which have been extensively tested by the Bureau in past years, proved but little superior to cast-iron ones, and were much more expensive, but the development of these new methods has resulted in the production of shell which not only carry large bursting charges, but also are capable of passing through nearly a caliber of steel armor without breaking, and this, too, at a cost but little in excess of cast-iron shell.

For common shell for the larger calibers, however, cast steel must still be used, not only on account of the resulting greater penetration in armor and to obtain a larger mining charge, but also because the strains of firing in the larger guns require the stronger material. The methods employed by Messrs. R. A. Hadfield & Co. of Sheffield, England, in the manufacture of the largest cast-steel shells have, upon the suggestion of this Bureau, been acquired by the Taylor Iron and Steel Company, of High Bridge, N. J., and a contract has been entered into with this company by the Department for 656 10-inch and 328 12-inch shells made by this process. In January last the necessity for a supply of the most effective common shell for the 10-inch guns of the *Miantonomoh* and *Monterey* caused the Department to order 550 of these shells from the Hadfield Company direct, and these shells have been made and inspected, three hundred have been received and the remainder are ready for shipment.

#### GUN MOUNTS.

The four mounts for the 10-inch guns of the *Miantonomoh* have been tested by firing at sea. While no serious defects have been developed, these mounts, being of an early type, are, at present, when compared with recent developments abroad and in this country, deemed as unsatisfactory, and it will be advisable to take an early opportunity in the progress of work at the naval gun factory to replace them with a more modern design.

The development of new methods of mounting the larger calibers, a consequence of the investigation of foreign systems made last year in pursuance of the Department's instructions (the mission of Lieut. Fletcher), has carried with it changes of great importance appertaining to the rapidity of fire, to the length of recoil, the space necessary at the rear of the gun for an efficient service, etc.

Coincident with the realization reached by this Bureau that the original designs of these mounts were defective, there came a demand for greater space at the rear because of an increase in the length of the barrel of the gun, by the prospective adoption, for all calibers, of smoke-powder (likewise affecting the recoil), and through the production of a breech mechanism.

1. The designs of the mounts for the 10-inch guns of the altered monitors and the 12-inch guns of the *Monterey*, and of the 13-inch guns of the ships, referred to in the Bureau's report of last year, w

duly completed, and typical specimens of the two systems under consideration were finished, mounted, and tested at Indian Head. They differ in detail as follows:

The 10-inch mount adopted for the *Monterey*, *Amphitrite*, and *Monadnock* is of the Mark II type. This mount is operated by water at a constant pressure of 600 pounds. The recoil is controlled by means of a piston working in a grooved cylinder, and the gun is returned to battery by the difference of pressures on the two faces of this piston.

The 10-inch, Mark III, mount has been adopted for the *Maine*. This mount has a piston working in a closed cylinder to control the recoil, with auxiliary cylinders for returning the gun to battery. Hand-working gear is provided for working these guns in the event of the failure of the hydraulic system.

The 12-inch mounts for the *Monterey* and *Puritan* are similar in design to the 10-inch, Mark II.

The type of mount adopted for the 12-inch guns of the *Texas* and the 13-inch guns of Battle Ships Nos. 1, 2, and 3 is the same as the 10-inch, Mark III.

The results of the tests at Indian Head of the type mounts were in all respects entirely satisfactory, and the Department may consider this most important auxiliary feature of the armament as successfully solved. (*Vide* reports, Inspector of Ordnance in charge Indian Head proving ground.)

A notable result of these improvements has been the application of hand power to the manipulation of the breech plugs of heavy guns. A new device of exceedingly simple construction has been designed and tested during the year, resulting in a much greater increase in the rapidity of fire than could have been at first anticipated. Where formerly by the use of hydraulic power the breech of the gun was required to be lowered and adjusted before the machinery could be set in motion for removing the plug, it can now, by means of the new device for hand power, be removed during the operation of depressing the breech to the loading position. Thus the hydraulic machinery used for this purpose is not only omitted, but the time formerly occupied in handling the plug is practically eliminated. The effect is to nearly quadruple the rapidity of fire.

The design which has been adopted by the Department is the invention of Lieut. F. F. Fletcher, U. S. Navy, of this Bureau, to whose talent and intelligence the Department also owes the entire system of rapid-fire mounting.

As mentioned in the last report, the Bureau decided to mount the 8-inch turret guns of Cruiser No. 2 (*New York*) and Cruiser No. 6 (*Olympia*) upon carriages which permit of the guns being worked by hand power throughout. The experience of the last year having further demonstrated the advantages of this principle, it has also decided to mount all the 8-inch turret guns of the battle ships in like manner. The designs for mounting these guns have been completed, together with the arrangements for hoisting and handling the ammunition. The four mountings for the turrets of the *New York* are in process of construction, two of which will be completed and tested prior to the publication of this report.

All the 8-inch central-pivot carriages and guns to be placed on the forecastles of Cruisers Nos. 12 and 13 and in the waist of the *New York* are now completed and ready to be placed on board those vessels. This completes the full number of carriages of this type required by vessels now laid down or in course of construction.

The manufacture of 6-inch carriages of the gravity return system has

continued without interruption. In all, one hundred and five have been completed, and ten more of this type are being manufactured to complete the list required for vessels now in course of construction.

The detail drawings of a new design, of mounting the 6-inch gun with recoil in the line of fire, has been completed, and the carriage is now in course of construction. It is expected to obtain greater rapidity and ease of manipulation, and it will resemble the rapid-fire type already applied to the smaller calibers.

Ten 5-inch rapid-fire carriages have been completed and ten others well advanced. Steel castings for thirty have been ordered, twenty-five of which have been received.

Fifteen 4-inch rapid-fire carriages have been completed and five more are well advanced. Forty sets of castings have been ordered, thirty of which have been received.

Experimental firing has continued during the year upon both the 4-inch and 5-inch carriages. No defects of any kind have been developed upon the proving ground.

A departure has been attempted in a design to mount a pair of guns upon one carriage. Such a mount is now nearly completed for two 4-inch rapid-fire guns, to which an electric motor is to be applied in connection with a new system of sighting the guns, by means of which it is expected that greatly increased accuracy of fire may be obtained. The author of this design is Lieut. F. F. Fletcher, of the Bureau's corps of assistants.

Twenty-six recoil mountings for the 6-pounder Hotchkiss rapid-fire guns have been completed during the year, and thirty-four are now in course of construction.

Ten mounts for the 3-pounder Hotchkiss will soon be completed. Work on the mounts for the 3-pounder Driggs-Schroeder guns has been suspended, owing to the nondelivery of a gun required for fitting them.

The new recoil carriages for the 1-pounder rapid-fire high-power guns mentioned in the last report as being completed have been tested with satisfactory results. Twenty-six of these have been completed during the year and thirty-nine more are in course of construction. It is the intention of the Bureau, for educational purposes, to utilize the 1-pounder gun as a practice barrel to be placed in the bore of the larger caliber guns, as the 10-inch, 12-inch, and 13-inch. The recoil of the gun being too severe to admit of a rigid fitting, a recoil adapter has been designed and successfully tested. Both the *Monterey* and the *Miantonomoh* have been supplied with them.

#### A VESSEL FOR THE SEA TEST OF ORDNANCE MATERIAL.

In perfecting the new types of gun-mountings, of all descriptions an entirely new system has been created and in the absence of any means to test its material afloat under service conditions the Bureau has found itself at serious disadvantage. It possesses no facilities for the sea test of war material and is thus obliged to issue to vessels their armament without having entirely demonstrated its efficiency in all directions.

In addition to work of the character mentioned, there are many mechanical and electrical devices that should be tested and developed in order to keep pace with modern progress in gunnery practice. Special facilities for this purpose are in use abroad in nearly all countries, and it is highly recommended that a small steamer be placed at the disposal of this Bureau for experimental work. It is confidently believed that the improvement of our material with such experimental work will more than pay for the cost of its supply.

## SMALL ARMS AND MACHINE GUNS.

The Bureau has been informed of the provisional adoption by the Ordnance Department of the Army of a rifle having a caliber of 0".30, to be of the system known as the Krag-Jorgensen. It is the intention of this Bureau also to recommend the provisional adoption of this piece, to arm the naval force with it temporarily, and a sufficient number, it is hoped, may be obtained from the Army Ordnance Department. It is anticipated, however, that a small arm having the qualities of what is known as a repeating arm rather than those furnished by a purely magazine type will be found eventually to be preferable. It is also anticipated that before a definite solution is reached with regard to smokeless powder some modification may be made in the conditions concerning the correspondence between weight of bullet, chamber space, etc., of the type of magazine small arm thus provisionally adopted.

The Bureau has, during the year, procured from abroad specimens of all the more notable foreign inventions in small arms, and these have received careful examination and study with a view to assist in making a suitable selection of the type gun.

The settlement of the question of the adoption of a machine gun has been naturally dependent upon the choice that would be made in regard to the small arm, it being desirable to use the same ammunition. The Bureau has, therefore, not taken steps leading to a definite conclusion on this subject, although its efficient development has not been lost sight of. An experimental gun has been ordered from J. G. Accles, long connected with the Gatling Gun Company, in which the feed has again been modified, to the end of supplying cartridges at the manufactory in cases of such form as will permit their immediate application to the piece, and from which they would be fed positively into the magazine of the gun. The Colt's Company and Mr. R. J. Gatling, of Hartford, Conn., are also occupied with the solution of this feature of the positive feed from packing cases, and the Bureau has good ground for believing that a successful result will be arrived at coincident with the final adoption of a military small arm of modern characteristics.

The Bureau desires to state in this connection that the whole of the inspection of the manufacture of war material by private parties in New England, comprising the works of Pratt & Whitney, Pratt & Cady, Colt's Fire Arms Company, Hartford, Conn.; Winchester Repeating Arms Company, New Haven, Conn.; Union Metallic Cartridge Company, Bridgeport, Conn.; American Projectile Company, Lynn, Mass.; Simonds Rolling Machine Company, Fitchburg, Mass., has been in charge of Ensign H. H. Eames, U. S. Navy, who has brought to its accomplishment an extraordinary amount of intelligent industry and capacity, of which the Bureau can not speak too highly. The interesting report of the operations of this inspectorship during the year is appended.

## FIELD GUNS.

The 6-pounder field guns referred to in the last report have been proved, together with their carriages, and turned over to the Naval Academy authorities for the use of the cadets. For this purpose they are satisfactory, but the experiments with them at Indian Head indicated the desirability of a larger caliber for use as a service landing gun on account of the advantages of the larger bursting charge and the use of shrapnel, and the Bureau has decided to manufacture a light 3-inch gun firing a 10-pound shell for this purpose. The material for

the type gun will be the noncorrodible nickel alloy of steel mentioned elsewhere, and the breech closure will be a late development of the slotted-screw type peculiarly fitted for rapid-fire work. Fixed ammunition will be used, and the mount, with its accessories, will be of a type approved by actual service abroad.

#### AUTOMOBILE TORPEDOES.

*Howell torpedo.*—The delivery of the torpedoes of the Howell type has been delayed, only one of these having been accepted by the Department to date, on account of changes in some of the details, which it is believed will materially improve its accuracy. Continued and exhaustive experiments have taken place during the past year and are still in progress by the contractors. The reports of these trials (on file in the Bureau) indicate that several torpedoes will soon be presented for official test, the only features that remain to be determined being the best form of propeller blade to give the greatest speed.

*Whitehead.*—The difficulty of obtaining suitable flasks for use with the Whitehead type of torpedoes has been satisfactorily solved.

The use of aluminium bronze or manganese bronze for these flasks has been found impracticable, but steel forgings have been delivered by the Bethlehem Iron Company and the Midvale Steel Company that meet all requirements. The physical characteristics in the accepted forgings are very considerably in excess of those obtained abroad.

The delivery of Whitehead torpedoes under the contract entered into between the Department and the E. W. Bliss Company, Limited, of Brooklyn, N. Y., has been prevented on account of the delay in obtaining the air flasks, but the contractors now have a number of torpedoes completed and undergoing adjustment trials which will soon be presented for official test.

The domestication of the manufacture of this weapon of war in the United States has been accomplished at a very slight expense to the Government, and the character of the manufacture, as well as the material employed, is of the highest grade.

*Hall.*—The torpedo designed by Lieut. M. E. Hall, U. S. Navy, has been constructed at the torpedo station, but its completion has been delayed, like that of the Whitehead, by the failure to obtain a satisfactory air flask.

The Bethlehem Iron Company has made and delivered two air flasks for this type of torpedo which have passed the required test, and one of them has been finished and the torpedo is now ready for balancing and its preliminary trials will soon commence.

#### LAUNCHING TUBES.

*Howell.*—Fifteen launching tubes for the Howell torpedo have been ordered, which have been allotted to mounts of different types, but their final acceptance is contingent upon the success and acceptance of the Howell torpedoes. Two of these tubes have been installed on board the *Stiletto* for experimental purposes.

*Whitehead.*—Ten launching tubes for the Whitehead torpedo have been ordered and assigned to the different mounts. Three of these have been installed on board the torpedo boat *Cushing*, one fixed in the bow and two mounted on a turntable on deck, and upon test proven satisfactory. Designs have been made for mounts for launching tubes to be used on board the vessels already built or under construction, which it is believed will satisfactorily meet the requirements for the effective service of the torpedoes.



## DIRIGIBLE TORPEDOES.

*Patrick.*—The two torpedoes remaining to be tested at the date of the last report have undergone the official trials and been accepted, and the Department is now in possession of three dirigible torpedoes of this system, two of which have been sent to the Pacific Coast.

*Sims-Edison.*—The Sims-Edison Company has delivered one of its torpedoes at the torpedo station, to be used in a series of experiments which the Bureau has in view in connection with a moving vessel and also with a submarine boat.

## SUBMARINE BOAT.

On May 24, 1892, the chief of this Bureau personally witnessed a private test at Detroit, Mich., of a submarine boat invented by Mr. George E. Baker, of Chicago, Ill.

Certain claims were made by the inventor as to endurance submerged and speed of the vessel and the chief of the Bureau requested that an attempt be made to steer a course 1 mile in length at a speed of about 6 knots per hour, which conditions are less than the efficiency claimed in these particulars.

A test which was made did not fulfill the conditions requested, but enough of the qualities of the boat were developed to indicate fair promise of success in the future, after certain ameliorations in motive power and methods of steering were applied, together with a more suitable locality as regards current and moving trading vessels. It was therefore requested of the owners of the boat that it be transferred to Chicago, where better water would be obtainable, when further trials would be made.

These requisite changes have been made in the boat and the Bureau expects a renewed trial in the near future, and it is proposed, in the event of a successful issue, that a test be also made of the application to this type of boat of a dirigible torpedo. It would seem that such application would be entirely practicable with either the Sims-Edison or Patrick methods of propulsion in a torpedo, and it is the Bureau's intention to recommend such further test.

It is believed that a submarine boat, either wholly or partially submerged, could be made an effective defensive weapon with either the dirigible torpedo or the submarine gun as the primary feature of its armament.

## TORPEDO BOATS.

*Cushing.*—The *Cushing* has been fitted at the Washington navy-yard with three launching tubes for the Whitehead torpedoes, one in the bow and two mounted on a turntable on deck. This boat is now equipped for service and has been placed temporarily under the orders of this Bureau for experimental duty in connection with the test of the Whitehead torpedoes. Advantage has been taken of this opportunity for the instruction of as many of the seamen gunners as can be accommodated on board, and these men will be competent for detail to vessels for torpedo duty as soon as the torpedoes are ready for issue.

*Stiletto.*—The *Stiletto* has been fitted at the torpedo station with two launching tubes for the Howell torpedo, one in the bow and one on turntable on deck, and has been almost constantly in use during the past summer in connection with the perfection of that type of torpedo. The seamen gunners under the regular course of instruction at the torpedo station are also detailed for duty in experimental work and during the official tests of torpedoes, thus affording them the opportunity of becoming familiar with these weapons.

**Torpedo Boat No. 2.**—The torpedo-launching tubes and their mounts, similar to those already installed on board the *Cushing*, have been ordered and will be ready when the vessel is accepted from the contractors.

#### ERICSSON SUBMARINE GUN AND PROJECTILE.

A series of tests of the 16-inch submarine gun mounted in the *Destroyer* have been carried on by the torpedo board, whose report upon this and other subjects under its cognizance will be found appended. These tests were made in the Erie Basin, Brooklyn, N. Y., and in the Simpson dry dock at the New York navy-yard, and they demonstrated that a fairly accurate range of at least 600 feet could be obtained from the submarine gun. The after bodies of the projectiles used were found too weak to stand the firing strains required to give still greater velocity and range, accompanied probably by greater accuracy, and the Bureau has decided to continue the tests with new and stronger projectiles as soon as they can be manufactured. This system of underwater discharge, when perfected, as it undoubtedly will be, will greatly increase the offensive power of the ram, and the Bureau will recommend that all such vessels be supplied with submarine guns.

#### A RAM PROPOSED.

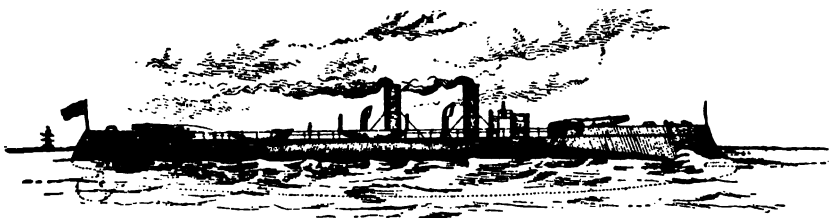
To this end, illustrating the application of submarine artillery as a primary element of the armament of a ram and at the same time utilizing the high explosives, propelled by a powder charge (which the recent successful experiments noted elsewhere have rendered entirely feasible), the Bureau has prepared and submits herewith for consideration a design of a vessel which represents effective features of offense and which would probably render good service in the defense of our seaboard cities.

The above-water guns are short-bored rifled mortars, firing projectiles of drawn or rolled nickel steel containing bursting charges of 200 pounds of high explosive. The pair of submarine guns—placed either in vertical or horizontal sense—designed to be discharged in rapid succession, is intended to use projectiles containing 500 pounds of high explosive.

The curved nickel-steel deck and submerged side armor (the last as a defense against the torpedo) present a combination of the elements of protection which it is believed would prove effective.

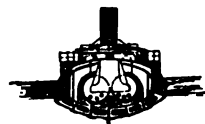
A sketch of the proposed vessel is appended.

Working drawings are on file in the Bureau of Ordnance.



BUREAU of ORDNANCE  
April 10 9 1896

RAM - PROPOSED BY  
COMMANDER W. M. Folger U.S.N.



## INVISIBILITY OF TORPEDO BOATS.

The desirability of obtaining a color that will render a torpedo boat as nearly invisible to the enemy as possible has caused the Bureau to experiment with a view of determining the most effective color for the purpose.

Samples of colors used by the torpedo boats of the Argentine Republic and France have been received from Commander R. B. Bradford, and the *Cushing* has been painted with the former. Some of the experiments with search lights have demonstrated the superiority of this color over many others that were in the vicinity at the time of the trial. Further tests and full comparisons between the colors used will be made as opportunity offers.

## FUEL FOR TORPEDO BOATS.

Reports from abroad indicate the successful use of petroleum, both in a liquid and in a solid form, as a fuel for torpedo boats, and the importance of this subject has caused the torpedo board to inquire as far as possible into the use of petroleum as fuel for steam boilers in the United States. As a result of these inquiries the board reports that it is successfully employed in a large number of manufacturing establishments and that it can be used in torpedo boats with great advantage. It is believed that on equal fuel weights a boat burning petroleum will be superior in the following points to a boat burning coal:

1. Her radius of action will be greatly increased.
2. Her fuel can be stowed more conveniently and never need trimming.
3. Her fire-room force need not be so great, owing to greater facility in tending fires.
4. Her fires will be under better control, enabling her to stop, slow, or quickly increase her speed with greater ease, economy, and rapidity.
5. The absence of flames and sparks will increase her efficiency, both in attack and retreat, and the absence of ashes and dust will make her more comfortable to live in.
6. Her boilers and boiler tubes will last longer, suffering less deterioration.

## TORPEDO-DEFENSE NETS AND FITTINGS.

An American manufacturer has under consideration a scheme of net defense, designed after thorough examination of the different systems in use abroad, which promises excellent results. The tests to determine the relative merits of different types of nets have not yet been made on account of some modifications in design and manufacture having prevented the delivery of one of the most promising of the American designs; but the Bureau hopes soon to be able to proceed with these trials.

Designs have been made for booms and fittings for torpedo-defense nets, and experiments are in progress to determine their proper proportions for minimum weight, effective strength, and facility of manipulation.

The subject of the development of a suitable wire for torpedo-defense nets is noted elsewhere in the discussion of noncorrodible nickel-steel alloys.

## TORPEDO BOARD.

The Bureau desires to note particularly the excellent work of Commander George A. Converse and the officers of the torpedo board in perfecting designs for the installation and efficient utilization, in the varied conditions presented by the different types of vessels, of the automobile-torpedo armament. It is believed that there will be but slight delay in supplying all vessels with an effective torpedo outfit as soon as the contractors make deliveries in sufficient numbers.

The report of the torpedo board is appended.

## GUN-FORGING CONTRACTS.

During the year additional orders for gun forgings for thirty-two 4-inch, twenty-seven 5-inch, and six 6-inch guns, and for one 8-inch gun of nickel steel have been placed, after advertisement, with the Bethlehem Iron Company. All the forgings under the original Bethlehem contract have now been delivered, and two sets of 13-inch, three of 12-inch, nine of 8-inch, and all the 6-inch forgings of their second contract.

The Midvale Steel Company has delivered two sets of 8-inch forgings and all the 4-inch, 5-inch, and 6-inch forgings ordered.

The following table shows the number of sets of forgings of each caliber thus far delivered and still due under outstanding orders and contracts.

	Delivered.		Ordered, but not delivered.	
	Midvale.	Bethlehem.	Midvale.	Bethlehem.
4-inch.....	25	42	0	0
5-inch.....	27	21	0	8
6-inch.....	83	51		6
8-inch.....	2	22	14	6
10-inch.....		22		
12-inch.....		7		1
13-inch.....		2		10

The forgings for the guns of the seagoing battle ship and the armored cruiser will be advertised for as the material is needed in the progress of work at the naval gun factory.

## ARMOR CONTRACTS.

At the date of the last report deliveries of armor under the contracts the Bethlehem Iron Company and Carnegie, Phipps & Co. had just made. During the past year the Bethlehem Iron Company has supplied 746.41 tons and Carnegie, Phipps & Co. 707.93 tons of armor; all of steel except a few plates, whose manufacture had already been completed before the final decision to adopt this material was reached.

At present all armor for the Navy is made of nickel steel, the various trials of the past three years having conclusively proved its superiority to the simple steel previously used.

During the past year both companies have materially increased their facilities for armor manufacture by additions to their machining plants.

It soon showed that the armor output depended entirely upon the existing facilities in the original state of both plants, the forged or treated plates being produced much more rapidly than they

could be machined, but a better balance has now been reached and the monthly output of each firm has increased correspondingly.

The different nature of the two armor plants results in greater facility or production of heavy plates at Bethlehem and of light plates at Carnegie, Phipps & Co.'s. Consequently it was found advisable to arrange an exchange of orders, the Bethlehem Company giving up certain of the armor for the monitors and taking instead a portion of the armor of the new battle ships. This transfer, made by mutual consent, has resulted in a more rapid advance in construction of the armored vessels most urgently needed.

The labor troubles at Homestead put a temporary stop to the armor manufactured by Carnegie, Phipps & Co., but work has again been begun, and it is hoped that in a short time the total armor product of both companies will reach six or seven hundred tons of finished plates per month.

Orders for armor to the full amount of both contracts having been placed, and there being about 7,000 tons still needed for ships authorized by law, the Department is preparing to advertise for bids for this quantity of armor, to be of nickel steel and to be treated by the Harvey process at the discretion of the Department.

The specifications for this new armor contract are now being prepared in the Bureau by Lieut. Kossuth Niles, so long and creditably associated with the work of the Bureau of Ordnance in the domestic development of the manufacture of armor. The specifications will shortly be completed.

The following table shows the amount of armor thus far supplied for the various armored ships being built:

Vessels.	Bethlehem Iron Company.	Carnegie Steel Company.	Total
	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>
Massachusetts .....	197.07	.....	197.07
Indiana .....	245.46	.....	245.46
Amphitrite .....	14.71	.....	14.71
Terror .....	15.18	.....	15.18
Monadnock .....	7.69	.....	7.69
Texas .....	57.45	.....	57.45
Maine .....	84.09	.....	84.09
Puritan .....	17.74	.....	17.74
Monterey .....	157.346	.....	157.346
New York .....	.....	387.95	387.95
Cruiser No. 6 .....	.....	234.25	234.25
Cruiser No. 7 .....	.....	35.79	35.79
Cruiser No. 8 .....	.....	8.11	8.11
Cruiser No. 9 .....	.....	6.37	6.37
Oregon .....	.....	5.69	5.69
Cruiser No. 10 .....	.....	13.34	13.34
Cruiser No. 11 .....	.....	14.44	14.44
Gunboats Nos. 5 and 6 .....	.....	9.15	9.15
Total .....	796.736	715.09	1,511.826

#### ARMOR DEVELOPMENT.

The test of nickel-steel armor treated by the Harvey process, referred to in the last report, led to the conclusion therein stated that a new principle in the manufacture of armor had been developed which there were good grounds for believing would furnish greater protection than any other system hitherto employed. Before, however, finally adopting this principle and entering upon the new manufacture upon a large scale, it was considered wise to make one further test, which

should conclusively prove its superiority. Accordingly the Bureau, with the Department's approval, ordered two more 10½-inch plates of nickel steel to be made by the Bethlehem Iron Company and to be Harveyized and then tempered by an improved method, the result of previous experience. These two plates differed in one respect, the first having been forged to 12½ inches and then Harveyized, and finally reformed to 10½ inches; the second having been forged to final dimensions before Harveyizing. The chemical and physical qualities and the treatment were the same for both plates.

The first of these plates was tested at Indian Head on July 26, 1892. The backing was 36 inches, and the target structure, side plates, etc., were exactly as in the previous trials. The gun used was an 8-inch B. L. R. of 35 calibers. Five Holtzer forged-steel shells, weighing 250 pounds each, and with a striking velocity of 1,700 feet-seconds and an energy of 5,008 feet-tons each, were fired at this plate, the points of impact being the same as in previous trials—the center and four corners.

The center and two left-hand shell were smashed on the surface of the plate without producing any injurious effect; the two right-hand shell penetrated to a depth of 13 inches, so that the wood just showed through star cracks at the bottom of the holes, and rebounded entire. When it is remembered that in previous trials but a single 8-inch shell was fired, the same velocity being used; that the corner impacts were all from 6-inch shot; and that even then the result that the plates were not destroyed was considered to indicate their superiority to foreign armor, the fact that this plate remained practically uninjured after receiving five blows of a total energy of 25,040 feet-tons was a demonstration beyond doubt or cavil of the advantages of the process. An explanation of the comparative softness of the right side of this plate was found in the fact that the re-forming after Harveyizing required the tongue hold to be retained on the plate during the carbonizing process. The result of this was a lower temperature on this side and consequently less carbonization, and that this was the true cause is rendered almost certain from the test of the second plate. This plate, supported and backed in the same manner as the first plate, was tested at the proving ground of the Bethlehem Iron Company, the same gun, projectiles and velocity being used. All five of these 8-inch Holtzer shell were smashed upon the surface of the plate without injuring it in any way other than opening a temper crack only 4 inches long from one edge and raising bulges three-fourths of an inch high on the back in wake of each impact.

It will be appreciated that these results speak for themselves, and need no further comment from this Bureau.

One more point remained to be determined. It had been objected to this process that the plate treated by it could not thereafter be bent without cracking. To test this point the Bureau has caused a third 10½-inch plate, after treatment, to be bent to shape of one of the *Monterey's* barbette plates. This operation was performed without the least difficulty, and the tempering process was carried out with complete success without materially changing the curvature.

After such results no doubt could remain as to the correctness of the conclusions of last year's report, and accordingly the Bureau has recommended that armor hereafter ordered be treated by the Harvey process in all cases. In the specifications for the new armor contract now being drawn up in the Bureau, the subject of more severe tests and requirements for this greatly improved product is being carefully considered.

The Bureau learns as this report goes to press that highly successful

tests have been made abroad of a 10½-inch nickel-steel plate treated by the Harvey process.

As a direct result of this successful development of hard faced armor, this Bureau is strongly of the opinion that the tendency abroad to decrease the caliber of the larger guns (their capacity for armor-piercing qualities being deemed sufficient) is premature. It seems probable that this tendency to a reduction of caliber will now come to an end, it being evident that great mass in the projectile has again become necessary to insure breaking through the hardened surface.

#### ARMAMENT OF NEW VESSELS.

The guns of the *Monterey*, two 10-inch and two 12-inch, are being installed. No other ship has been sufficiently advanced since the last report to receive her armament.

No further test of the *Vesuvius* has yet taken place, owing to delays in the deliveries of projectiles for her air guns.

The work of installing the mounts and machinery for working the *Terror's* 10-inch guns is being carried on by the contractors—the Pneumatic Gun-Carriage and Power Company—at the New York navy-yard. The guns for this vessel are ready for installation whenever the mountings are completed.

It is thought that the state of work at the Washington navy-yard is such that there will be no delay in supplying any vessel hereafter with her complete ordnance outfit as soon as she is ready for it.

#### INSTRUCTION OF ENLISTED MEN.

The instruction of enlisted men at the Washington gun factory and at the naval torpedo station has continued during the year.

At the gun factory the average number of seamen under instruction was 26, and 37 qualified as seamen gunners after the six months' course. At this station the practical use of machine tools is taught, the methods of manufacture of all sorts of ordnance material become familiar, and the men are exercised at small-arm practice.

At the torpedo station an average number of 21 were under instruction, and 31 qualified as seamen gunners after a six months' course. At this station the men are given a practical knowledge of the service torpedoes, of electricity, and of the manufacture of fuses and explosives, and are exercised in submarine work.

#### GUN FACTORY.

The shops of the gun factory have run at full time throughout the past year, with an average number of employes of 989. The principal work has been the manufacture of guns from 4 to 13 inches in caliber and of their mounts, but much miscellaneous ordnance work has also been carried on.

The eight gun lathes contracted for last year have been delivered and installed and are in successful operation. One of these lathes has a capacity for boring guns 51 feet in length and turning tubes 57 feet in length, and consequently will bore and turn a gun of 16 inches caliber. Two are boring and turning lathes for guns of 12 inches caliber or less, having a capacity for boring guns 32 feet in length and for turning guns 37 feet in length. The remaining three are turning lathes

with a capacity for turning guns 51 feet in length, and hence equal to turning a 16-inch gun.

A special apparatus, due to Mr. William Sellers, of Philadelphia, Pa., is the feature possessed by these tools of an independent movement of the boring bar. It is thus rendered possible to regulate the turning speed for any diameter of object and at the same time to bore under conditions of greatest efficiency. It is believed that these are the only tools in existence of this size possessing the feature indicated.

The Department is to be congratulated upon this group of machine tools, which are probably the finest of their kind in existence.

A rifling machine for the heaviest guns, designed and manufactured in the Washington gun factory, has been completed and is in operation.

The hot-air furnaces in the shrinking pit are an unqualified success, having been in operation now nearly one year.

The improvements in the breech mechanism shop, for which an appropriation was made last year, are progressing, and when completed this shop will be a valuable extension of the plant.

Preparations for lighting the shops at night have been made by the installation of 524 incandescent lights and two Thomson-Houston dynamos.

The need of more floor-space is becoming pressing, and for this purpose Store No. 10, an unfinished foundry, is being gradually improved, and will, in course of time, be put in condition for a storehouse.

The addition to yard plant of a heavy wrecking car with a 15-ton derrick would be of great service, as heavy castings, etc., could then be handled along the tracks in the yard and picked up as required instead of occupying valuable floor-space in the shops. The Bureau of Yards and Docks has estimated for such a car, and it is hoped that the necessary amount will be allowed.

The work, as heretofore, has been carried on under the direct supervision of the line officers on duty at the yard, who are not only made responsible for the accuracy when completed, but are charged with its superintendence throughout. The complete success of this arrangement and method is a source of congratulation to the Bureau.

The annual report of the inspector of ordnance is appended.

Commander Charles O'Neil, the inspector of ordnance, has recently been detached and ordered on sea duty. The excellent character of his services while on duty at the yard is well known to the Department, but deserves at this time especial mention by the Bureau.

Commander O'Neil has been replaced by Capt. W. T. Sampson, U. S. Navy.

#### NAVAL ORDNANCE PROVING GROUND.

The proving ground at Annapolis has been closed and the material has been transferred from that station to Indian Head, where all naval ordnance tests and experiments are now carried on.

During the year considerable improvements have been made at the Indian Head proving ground, the hills on both sides of the valley have been cut away to make room for gun platforms and to clear a line of view down the range, and the earth from these cuttings has been used in filling off the valley. The stream through the valley has been further improved by piling, and drains to conduct the rainwater into it have been constructed with a view to lessen the annoyance due to mud



which last winter was the cause of frequent delays in the work; an explosion chamber has been constructed; the range has been surveyed and marked off and a chart been made on a sheet of brass; retaining walls to prevent damage from the blast of the heavier guns have been built in several places, and numerous other smaller repairs and improvements have been made.

Two more cottages have been completed and are occupied, and a small boat-house has been erected.

The purchase of a farm known as the Irwin estate will prevent any possibility of pieces of projectiles reaching private property. This land is of good quality and is used to raise feed for the live stock employed at the station.

During the past year the usual work of proving guns and their mounts and testing armor plates, powder, and projectiles for acceptance has been carried on, and, in addition, many important experimental tests have been made. The tests of the smokeless powder in the various calibers were made at this station, as well as tests of emmentite as an explosive charge for shell to be fired from powder guns. In the test of the Dashiell rapid-fire breech mechanism, adopted by the Bureau for 4-inch and 5-inch guns, 4-inch rapid-fire gun No. 11 was fired 248 times and the mechanism was worked about 8,000 times with tight-fitting cases without failure of the action of any part. Experiments with time and percussion fuzes, with different forms of primers and firing attachments, and with sights have also been carried on, with other tests too numerous to mention.

The Department may now consider that the capacity of the proving ground at Indian Head, Md., for any nature of work whatsoever will meet all demands that may be made upon it, the station being admirably equipped in every particular.

As is already appreciated by the Department the greater portion of its special details and facilities are the creation of Ensign R. B. Dashiell, U. S. Navy, the inspector of ordnance in charge. The Bureau can not speak too highly of the services of this officer and his assistants, Ensigns Dieffenbach and Rust, who, through all the hardships and inconveniences attendant upon duty at an isolated position, have performed their task cheerfully and with ability.

Ensign Dashiell's interesting and valuable report is appended.

#### NAVAL TORPEDO STATION.

The Naval Torpedo Station at Newport, R. I., has remained under the charge of Commander Theo. F. Jewell, U. S. Navy, during the past year.

Certain necessary repairs to the buildings and to the storehouses have been carried out and the plant for the manufacture of smokeless powder has been somewhat increased.

Torpedo outfits were supplied during the year to the *Kearsarge*, *Miantonomoh*, *Ranger*, and *San Francisco*; also the Naval Academy, Mare Island navy-yard, and Washington Marine Barracks. One hundred spar torpedoes with attachments were sent to the Mare Island navy-yard.

Experiments with a defense mine have been carried on, and it is thought that a satisfactory design will soon be completed.

Ballistic tests of smokeless powder in small caliber rifles have been continued during the year.

A large amount of chemical work has been carried on in the laboratory under the direction of Prof. C. E. Monroe, including many analyses and investigations into the compositions and characteristics of modern powders. One of the most interesting results was the determination of the volatility of nitroglycerine in all temperatures.

During the year about 28,000 pounds of gun cotton were made at the station.

A valuable device to facilitate the electric firing of guns has been designed by Lieut. T. C. McLean, and its experimental test will be made in the near future.

Attention is called to the interesting and valuable report of Commander Jewell, which is appended. The work at this station has been most intelligently and economically carried out, and the officer in charge deserves commendation.

#### NAVAL MAGAZINES.

The buildings being erected on the Government reservation near Dover, N. J., consisting of a magazine, shell house, and three small cottages for a gunner and two watchmen, have been completed and are occupied. Besides these, the necessity for another magazine building has caused the Bureau to advertise for bids for building a duplicate of the one already in use.

All powder hereafter made on the Atlantic Coast will be stored at this depot, and the ammunition now at Fort Wadsworth, with the exception of enough for supplying two ships, will be transferred there at once. It is the intention of the Bureau to make this station a general store for explosives intended for the Atlantic seaboard.

The superintendence of the construction of these magazines and shell house has been under the efficient charge of Commander J. B. Coghlan, U. S. Navy, the inspector of ordnance at the League Island naval station.

The magazine, shell house, and wharf on Japonski, Sitka, Alaska, have been completed and are in use.

The work of dredging a channel to the Craney Island magazine, and repairing the wharf and buildings, has been completed under the contract referred to in the last report.

In order to make room for the new powder and ammunition at Mare Island, the Bureau finds it necessary to bring East about half of the 250 tons of old black powder there stored. The earliest available Government transportation will be taken for this transfer.

On June 13, last, a most deplorable accident occurred in the blowing up of the filling house at Mare Island, resulting in the death of the entire party there engaged—Gunner Hittinger and fifteen enlisted men from the U. S. S. *Boston*. The cause of this explosion can only be a subject of conjecture, since all those present were killed, but it is probable that it resulted from the crushing of a grain of the black powder with which shell were being filled. The presence of so large a party of men during the dangerous operation of filling shell, and the accumulation in the same place of a very large quantity of powder were the causes of the magnitude of this accident, and the Bureau has taken steps to prevent such a state of affairs in the future.

The report upon this explosion is appended.

## MISCELLANEOUS.

## ALLOYS OF NICKEL AND STEEL.

A further acknowledgment is due to Mr. James Riley, of Glasgow, from this Bureau in regard to the application which has been made of the alloys of nickel steel so admirably described in his lecture before the Iron and Steel Institute in 1889.

In developing a domestic source for the production of suitable wire for torpedo netting the Bureau found itself confronted with a record of rapid deterioration from corrosion in foreign services, and with a view of securing a noncorrodible metal prepared the specifications and ordered a quantity of high-grade nickel steel from the Bethlehem Iron Company. This has been delivered and has been subjected to an extensive series of tests as to the feature of corrodibility in particular and in general to all the usual physical requirement.

The admirable qualities signaled by Mr. James Riley have been abundantly verified and in certain directions exceeded in a marked degree.

The following table of tests of 2-inch standard naval specimens is illustrative of the characteristics noted:

Dimensions of specimen.		Tensile strength.	Elastic limit.	Per cent of elongation.	Per cent of contraction.	Treatment.	Remarks.
Size.	Length.						
<i>Inch.</i>	<i>Inches.</i>						
.500	2	114,590	56,020	47.25	68.44	Unannealed.	These specimens were turned to standard Navy size, were cut from 1/2 inch rolled round bar. Modulus of elasticity of bar, 4,386 B <sub>1</sub> —25,780,000; 4,386 B <sub>1</sub> A—25,890,000.
.590	2	115,610	59,080	45.25	62.29		
.495	2	113,880	56,160	40.50	62.02	Annealed.	
.499	2	116,070	57,270	43.50	62.13		

It will be observed that the elastic limit, which feature received considerable mention in the discussion before the Iron and Steel Institute, is satisfactorily high.

It is also noted that the extraordinary elongation is not confined to any particular section of the specimen, but is a uniform molecular distortion throughout the entire mass. This, it is believed, will be a precious quality in the application of this metal to the arts in general and to gun construction in particular.

The feature of slight corrodibility noted by Mr. James Riley may be considered as reaffirmed by a series of acid tests at the Newport (Torpedo Station) Laboratory, and by the immersion of construction plates in sea water at Newport and at Pensacola, Fla.

It is practically noncorrodible in the atmosphere.

The Bureau has had wire, suitable for torpedo netting, drawn from this material, and the excellent physical qualities in the bar have been further illustrated in the wire.

The Bureau is of the opinion that the noncorrodible quality of the alloy, coupled with other physical characteristics, renders it specially adapted to the construction of guns subjected to high pressures with nitro-powders, believing that the erosion effects are largely due primarily to *chemical* action by the powder gases. To determine this a small gun of the field-artillery type and a few small-arm barrels will be made of this material.

At the request of the Bureau of Ordnance a series of magnetometer tests were made of samples of the 25 per cent nickel alloy by the Bureau of Equipment, in comparison with the action with ordinary steel. The results obtained were extremely satisfactory, the report stating as follows:

"The conclusion reached from the compass point of view is that since the nickel steel submitted is about one-tenth as susceptible to magnetic influences as the ordinary steel bar it is much more desirable for conning towers than the ordinary steel."

The Bureau will recommend the conning tower of one of the new vessels to be made of this metal.

#### THE FIRING DEVICE.

With the performance of one feature, namely, the firing device, the Bureau is not entirely satisfied, after consideration of the experience gained in about three or four years' of service with the guns afloat. The percussion lock, while probably as simple as any of its kind in use abroad, occasionally misses fire, and thus introduces an element of doubt which in time of action would be extremely disadvantageous. It may be said that the study of the lock has received more attention than any other individual feature of the details of the armament.

An endeavor is being made to perfect the friction primer to a point of its meeting, as an alternative, the requirements of service use. A difficulty has been experienced in securing suitable nonoxidizable wire, but it is probable that this difficulty will be obviated by the application of one of the nonoxidizable nickel-steel alloys.

The Bureau proposes, however, in case experiments therewith are successful, to substitute in the near future for the percussion lock an electric primer to be used in connection with a small portable battery which the gun captains may carry at their waist belts. Such a device, as has already been noted elsewhere, has been designed at the Torpedo Station and is now being tested at the proving ground.

The advantages of electric fire, if certainty of action can be secured, will be distinctly apparent, particularly in the small interval of time that will result between the intention to fire and its consummation.

During the year a simple design of a combination time and percussion fuze has been settled upon and a number have been manufactured and tested, with promising results.

The floating or tug crane, mentioned in the last report as having been contracted for, has been accepted, and is in use at the New York navy-yard.

A number of experiments made at Indian Head with steel mats have satisfied the Bureau that they are inferior to steel plating of equal weight as a means of protection against small projectiles and fragments of exploded shell.

The telegraph and telephone line to the Indian Head Proving Ground, authorized by the last Congress, has been contracted for, and its construction will be at once begun. The value of this means of communication will be great, and it will result in a more efficient dispatch of the Bureau's business.

#### ARMORED TURRETS.

**I**n the year the Bureau has submitted a number of designs and as in connection with the subject of turrets for heavy guns, utilizing, generally, foreign developments in these particulars.

A design embodying the latest ideas of the French system considered most thoroughly worked out and advantageous, is herewith submitted for consideration in connection with the design of sea-going battle ship No. 1.

#### BUREAU'S RECORDS AND ACCOUNTS.

During the past year many improvements have been made by Mr. Joseph Brummett, the chief clerk, in the system of accounts and business methods of the Bureau. Among these may be mentioned the introduction of a journal and ledger, in which all the financial transactions of the Bureau are recorded, and by means of which ready reference can be had and the exact condition of any individual account or appropriation ascertained.

The Bureau's drawings, 5,000 in number, have been rearranged and catalogued in such manner that any drawing can now be readily produced and consulted.

These, and other improvements which have been made, including the new forms of returns from ships and naval stations, have greatly facilitated the work of the Bureau.

#### CHIEF CLERK OF THE BUREAU.

The duties of this position are very arduous and require a great amount of technical knowledge, and much depends upon their satisfactory performance. The present incumbent has had more than thirty years' continuous service and experience in ordnance work, and has proven himself a valuable assistant to the Chief of Bureau. In the absence of the Chief of Bureau on business or leave, the chief clerk, as required by law, becomes the acting Chief of the Bureau, and he has on each occasion acquitted himself very satisfactorily. The present salary (\$1,800 per annum) is not commensurate with the responsibilities of the position and the duties performed, and an increase of salary to \$2,500 is fully warranted and earnestly recommended.

#### OFFICERS PERFORMING ORDNANCE DUTY.

The following are the officers of the Navy employed under this Bureau, with their respective stations and duties:

Name and station.	Duties.
Commander George A. Converse.....	President of the Board charged with the subject of torpedoes and torpedo boats, etc.
Lieut. Commander A. R. Couden.....	Armor and gun steel.
Lieut. Chas. A. Bradbury.....	Member of Board on torpedoes and torpedo boats.
Lieut. Kossuth Niles.....	Preparation of specifications for new armor contract.
Lieut. F. F. Fletcher.....	Mounts for primary and secondary battery guns; breech mechanisms, etc.
Lieut. C. J. Boush.....	Mounts for 6-inch guns, magazines, and storage of ammunition.
Lieut. A. E. Culver.....	Ships' invoices and estimates.
Ensign I. K. Seymour.....	Powder and shrinkages of gun forgings.
Ensign T. C. Fentor.....	In charge of development of engineering and construction details of turret mounts.
Prof. P. R. Alger.....	Marine artillery construction, powder, armor, and gun steel.
WASHINGTON NAVY-YARD.	
Capt. W. T. Sampson.....	Inspector of ordnance.
Lieut. Commander E. C. Pendleton.....	General charge of the arrangement and distribution of work in the gun shop and gunner's gang; installation of machinery.
Lieut. Commander R. E. Carimody.....	Aid to commandant, board of labor employment, and inspection board.

Name and station.	Duties.
<b>WASHINGTON NAVY-YARD—Continued.</b>	
<b>Lieut. Commander C. O. Allibone</b> .....	In charge of the manufacture of 5-inch guns, their mounts, shields, and accessories.
<b>Lieut. Herbert Winslow</b> .....	In charge of the manufacture of ammunition hoists.
<b>Lieut. F. H. Crosby</b> .....	In charge of the manufacture of turret mounts and 8-inch mounts of the <i>New York</i> .
<b>Lieut. F. E. Greene</b> .....	In charge of the manufacture of 6-inch carriages and miscellaneous work.
<b>Lieut. Downs L. Wilson</b> .....	In charge of the manufacture of secondary battery mounts, powder tanks, and patterns.
<b>Lieut. C. J. Badger</b> .....	In charge of the manufacture of 4-inch guns, their mounts, shields, and accessories.
<b>Lieut. A. Reynolds</b> .....	In charge of the manufacture of 8-inch guns.
<b>Lieut. J. H. L. Holcombe</b> .....	In charge of the manufacture of primers, projectiles, articles for the naval proving ground, and target frames for armor test.
<b>Lieut. J. H. Gibbons</b> .....	In charge of the manufacture of gun locks, fuzes, etc.
<b>Ensign J. M. Poyer</b> .....	Assistant to the officer in charge of the manufacture of 4-inch guns, their mounts, shields, and accessories.
<b>Ensign A. L. Key</b> .....	In charge of the manufacture of 12-inch and 13-inch guns.
<b>NAVY-YARD, NORFOLK, VA.</b>	
<b>Lieut. Commander W. T. Burwell</b> .....	Inspector of ordnance.
<b>NAVY-YARD, LEAGUE ISLAND, PENNSYLVANIA.</b>	
<b>Commander J. B. Coghlan</b> .....	Inspector of ordnance; also in charge of the erection of buildings at the new naval magazine, Dover, N. J.
<b>NAVY-YARD NEW YORK.</b>	
<b>Commander Horace Elmer</b> .....	Inspector of ordnance.
<b>Lieut. Commander H. B. Mansfield</b> ..	Assistant inspector of ordnance.
<b>Lieut. George A. Calhoun</b> .....	Assistant inspector of ordnance.
<b>NAVY-YARD BOSTON.</b>	
<b>Commander George H. Wadleigh</b> .....	Inspector of ordnance.
<b>Commander A. J. Iverson</b> .....	Charge Niter Depot, Malden, Mass.
<b>NAVY-YARD, PORTSMOUTH, N. H.</b>	
<b>Commander A. Mayo Dyer</b> .....	Inspector of ordnance.
<b>NAVY-YARD, MARE ISLAND, CAL.</b>	
<b>Commander Charles E. Clark</b> .....	Inspector of ordnance.
<b>TORPEDO STATION.</b>	
<b>Commander Theodore F. Jewell</b> .....	Inspector of ordnance, in charge of station.
<b>Lieut. Commander H. W. Lyon</b> .....	General charge of buildings and grounds, boats, boat houses, wharves, etc.; the supervision and discipline of enlisted men; the detail of seamen under instruction in the different branches, and the general supervision of the course of instruction; and the immediate charge of the instruction in diving.
<b>Lieut. Commander Charles Belknap</b> ..	Charge of the machine shop and gun-cotton and smokeless powder factory; the preparation of outfits, the manufacture of primers and detonators, and the instruction in fuse-making.
<b>A. T. C. McLean</b> .....	Charge of the electrical laboratory and dynamo room and all electrical plant; of experimental electrical work and instruction in electricity; member of board on torpedoes and torpedo boats; also inspects work on Whitehead torpedo at the works of E. W. Bliss & Co., Brooklyn, N. Y. Tests of small-arm smokeless powder.
<b>A. Martin E. Hall</b> .....	Attached to the Torpedo Station for duty in connection with the manufacture of a torpedo of his own design, and has been employed in experimental work as his services were required.
<b>Lieut. William A. Marshall</b> .....	Charge of general torpedo work, the inspection of torpedo outfits and of magazines and manufactured explosives, and instruction in torpedo work, countermining, etc.
<b>R. C. Smith</b> .....	Trials and tests of smokeless powder.
<b>PROVING GROUND, INDIAN HEAD, MD.</b>	
<b>L. B. Dashiell</b> .....	Inspector of ordnance, in charge of station.
<b>Diessenbach</b> .....	Assistant.
<b>Tisdale</b> .....	Do.

Name and station.	Duties.
<b>PRIVATE WORKS.</b>	
Lieut. W. C. Cowles .....	Inspector of ordnance, in charge of the manufacture of armor at the works of Carnegie, Phipps & Co., Pittsburgh and Munhall, Pa.
Lieut. William A. Gill .....	Assistant to above.
Lieut. John Hubbard .....	Inspector of ordnance at the works of E. W. Bliss Co., Brooklyn, N. Y., of Whitehead torpedoes.
Lieut. Karl Rohrer .....	Inspector of ordnance, in charge of the manufacture of armor and gun steel at the works of the Bethlehem Iron Company, South Bethlehem, Pa.; also of armor-piercing shell at the works of the Carpenter Steel Company, Reading, Pa.
Ensign Fred. R. Brainard .....	Assistant to above.
Lieut. F. J. Drake .....	Member of board on torpedoes and torpedo boats; also inspector of ordnance, in charge of the manufacture of the Howell torpedoes at the works of the Hotchkiss Ordnance Company, Providence, R. I.
Lieut. C. W. Ruschenberger .....	Inspector of ordnance, in charge of the manufacture of gun-carriage castings at the works of the Midvale Steel Company, Nicetown, Philadelphia, Pa., and of gun-carriage castings at the works of the Standard Steel Casting Company, Thurlow, Pa.
Ensign H. H. Eames .....	Inspector of ordnance, in charge of the manufacture of rapid-fire and machine guns and their ammunition, and of small arms and their ammunition, at the works of Pratt & Whitney, Pratt & Cady, Colt's Fire Arms Company, Hartford, Conn.; Winchester Repeating Arms Company, New Haven, Conn.; Union Metallic Cartridge Company, Bridgeport, Conn.; American Projectile Company, Lynn, Mass.; Simonds Rolling Machine Company, Fitchburg, Mass., and Cramps' ship-yards, Philadelphia, Pa.
Ensign A. M. Beecher .....	Assistant.

The Bureau desires to mention the intelligence, zeal, and industry of all the assistants on ordnance duty, which have contributed so largely to the progress made during the past year.

The following statements are appended, viz:

- A.—Statement showing the amount appropriated under each specific head of appropriation for the service of the Bureau of Ordnance during the fiscal year ending June 30, 1892, expenditures during the same period, and balance remaining on hand June 30, 1892.
- B.—Statement of the number of days' labor and cost thereof from July 1, 1891, to June 30, 1892, at the respective navy-yards and stations, chargeable to the Bureau of Ordnance.
- C.—Amounts expended during the fiscal year ending June 30, 1892, from the appropriations under the Bureau of Ordnance, for civilians employed on clerical duty, or in any other capacity than as ordinary mechanics and workmen.
- D.—Abstract of offers for furnishing supplies or services, and which were contracted for by the Bureau of Ordnance during the fiscal year ending June 30, 1892, and contracts awarded thereon.

Very respectfully,

WM. M. FOLGER,  
Chief of Bureau.

The SECRETARY OF THE NAVY.

- A.—Statement showing the amount appropriated under each specific head of appropriation for the service of the Bureau of Ordnance during the fiscal year ending June 30, 1892, expenditures during the same period, and balance remaining on hand June 30, 1892:

Appropriation.	Appropriated.	Expended.	Balance June 30, 1892.
Ordnance .....	\$155,000.00	\$127,604.71	\$27,395.29
Repairs .....	30,000.00	25,156.78	4,843.22
Civil establishment .....	26,824.00	25,234.77	1,589.23
Contingent .....	8,000.00	4,955.93	3,044.07
Torpedo Station .....	60,000.00	46,616.62	13,383.38
Total .....	279,824.00	229,568.81	50,255.19

## The amounts expended were—

For labor .....	\$149,836.57
For material, etc .....	79,732.24

The balances remaining are all needed to meet outstanding obligations, except the balance under "Civil establishment."

The above statement does not embrace continuous appropriations for the new ships or for special objects.

**B.—Statement of the number of days' labor and cost thereof from July 1, 1891, to June 30, 1892, at the respective navy-yards and stations, chargeable to the Bureau of Ordnance.**

Navy-yards.	Number of days.	Cost.
Portsmouth .....	779	\$1,886.80
Boston .....	1,021	2,407.35
New York .....	18,431	51,189.78
League Island .....	4,340	7,608.72
Washington .....	322,278	791,383.49
Norfolk .....	4,594	9,291.34
Pensacola .....	313	524.84
Mare Island .....	5,245	14,366.59
Key West .....	31	75.00
New London .....	15	25.25
Naval Ordnance Proving Ground, Annapolis .....	4,880	6,189.87
Naval Proving Ground, Indian Head .....	27,778	43,577.77
Torpedo Station .....	16,071	39,834.48
<b>Total .....</b>	<b>405,716</b>	<b>968,316.28</b>

Includes labor on outfits for the new ships and under appropriations for special objects.

**C.—Amounts expended during the fiscal year ending June 30, 1892, from the appropriations under the Bureau of Ordnance for civilians employed on clerical duty or in any other capacity than as ordinary mechanics and workmen:**

Navy-yard.	Rating.	Amount paid.
Portsmouth .....	1 writer (6 months) .....	\$500.00
Boston .....	1 writer (3½ months) .....	283.18
New York .....	1 assistant expert in steel (Bethlehem Iron Works) .....	1,535.00
	1 clerk .....	1,400.00
	1 writer (Pittsburg, Pa.) .....	672.05
	1 engineer expert (on Vesuvius) .....	1,269.67
Washington .....	1 clerk .....	1,600.00
	1 clerk .....	1,200.00
	1 writer .....	1,017.25
	1 writer .....	1,017.25
	1 telegraph operator and copyist .....	930.00
	1 copyist .....	720.00
	1 copyist .....	694.35
	1 draftsman .....	1,800.00
	1 draftsman .....	1,081.00
	1 draftsman .....	1,081.00
	1 draftsman .....	1,081.00
	1 draftsman .....	1,413.00
	1 draftsman .....	1,200.00
	1 draftsman .....	1,094.19
	1 draftsman .....	1,053.06
	1 draftsman .....	1,046.50
	1 draftsman .....	1,107.31
	1 draftsman .....	1,075.81
	1 draftsman .....	1,049.56
	1 draftsman .....	839.00
	1 draftsman .....	625.50
	1 draftsman .....	627.74
	1 draftsman .....	622.88
	1 draftsman .....	595.50
	1 draftsman .....	423.00
	1 assistant draftsman .....	177.67
	1 writer .....	1,256.00
	1 writer .....	1,228.00
	1 writer .....	1,075.81
	1 writer .....	818.22
	1 writer .....	963.57
	1 writer .....	390.00
	1 writer .....	1,143.86



*C.—Amounts expended during the fiscal year ending June 30, 1892—Continued.*

Navy-yard.	Rating.	Amount paid.
Washington .....	1 writer .....	\$943.88
	1 writer and copyist .....	946.88
	1 copyist .....	55.42
	1 copyist .....	1,004.08
	1 stenographer and typewriter .....	485.00
	1 chemist .....	1,750.88
	1 foreman .....	1,500.00
	1 foreman .....	1,500.00
Norfolk .....	1 clerk .....	1,200.00
Mare Island .....	1 writer .....	1,017.25
Naval ordnance proving ground, Annapolis, Md .....	1 writer (2 months and 6 days) .....	186.49
Torpedo station .....	1 chemist .....	2,500.00
	1 clerk .....	1,200.00
	1 draftsman .....	1,500.00
		53,487.04

*D.—Abstracts of offers for furnishing supplies or services, and which were contracted for by the Bureau of Ordnance during the fiscal year ending June 30, 1892, and contracts awarded thereon.*

Craney Island, Norfolk, Va. (Advertisement dated May 28, 1891.)	
Dredging, repairing wharf, etc.—	
Joseph Baker .....	* \$14,558.08
Ross & Sanford .....	13,960.64
H. E. Culpepper .....	Informal.
Geo. E. White .....	Informal.
Magazine, Dover, N. J. (Advertisement dated June 5, 1891.)	
Magazine, shell house, dry and wet gun-cotton houses, filling house, dwelling, and two cottages.	
Allen & Palmer .....	\$32,632.00
L. H. Focht .....	42,952.11
Wilcox and Berry .....	40,590.00
J. J. Vreeland .....	† 38,938.00
Magazine and shell house, Sitka, Alaska. (Advertisement dated May 23, 1891.)	
C. W. Young and E. J. Ellengen .....	† \$4,200.00
Wharf, approaches, etc., magazine, Sitka, Alaska. (Authorized by Bureau's letter of May 23, 1891, to Commander Farenholt.)	
C. W. Young and E. J. Ellengen .....	† \$3,314.00
Floating or tug crane. (Advertisement dated September 15, 1891.)	
Charles Reeder & Sons .....	\$39,265.00
E. J. Codd & Co .....	28,743.00
H. Brusstar & Bro .....	28,500.00
Dennis McCarthy .....	\$26,400.00
Forty-ton crane. (Advertisement dated October 26, 1891.)	
William Sellers & Co .....	\$32,221.00
Piling at Craney Island. (Advertisement dated April 6, 1892.)	
Joseph Baker .....	¶ \$1,795.00
H. E. Culpepper .....	1,849.00
W. B. Brooks, jr .....	2,395.00
Buildings and fencing, magazine, Dover, N. J. (Advertisement dated May 28, 1892.)	
J. H. Hathaway & Co .....	\$17,675.00
John Cox .....	20,270.00
Jos. H. Cutley .....	15,691.00
J. J. Vreeland .....	** 15,158.00

\* Accepted. Contract dated July 1, 1891.

† Accepted. Contract dated July 18, 1891.

‡ Accepted. Contract dated July 25, 1891.

§ Accepted. Contract dated October 8, 1891.

|| Accepted. Contract dated November 7, 1891.

¶ Accepted. Contract dated May 4, 1892.

\*\* Accepted. Contract dated June 21, 1892.

*Estimates of appropriations required for the service of the fiscal year ending June 30, 1894, by the Bureau of Ordnance, Navy Department.*

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1893.
<b>SALARIES.</b>			
Chief clerk (R. S., p. 70, sec. 416; act July 16, 1892) .....	\$1,800.00		
Draftsman (same acts) .....	1,800.00		
One assistant draftsman (act July 11, 1888; vol. 25, p. 283, sec. 1; act July 16, 1892) .....	1,400.00		
One clerk of class 3 (R. S., p. 27, sec. 1670; act July 16, 1892) .....	1,600.00		
One clerk of class 2 (same acts) .....	1,400.00		
One clerk of class 1 (R. S., p. 27, sec. 167; act July 16, 1892) .....	1,200.00		
One clerk (same act) .....	1,000.00		
One copyist (same act) .....	900.00		
One assistant messenger (same act) .....	720.00		
One laborer (same act) .....	660.00		
		\$12,480.00	\$12,480.00
<b>ORDNANCE AND ORDNANCE STORES.</b>			
Procuring, producing, preserving, and handling ordnance material; for the armament of ships; for fuel, tools, and material, and labor to be used in the general work of the Ordnance Department; for furniture at magazines, at the ordnance dock, New York, and at the naval proving ground (see note) (appropriated; act July 19, 1892) .....	220,000.00		
Expenses of target practice (appropriated; act July 19, 1892) .....	15,000.00		
Maintenance of naval proving grounds (appropriated; act July 19, 1892) .....	5,000.00		
Proof of naval armaments (appropriated; act July 19, 1892) .....	10,000.00		
		250,000.00	180,000.00
NOTE.—This increase is necessary for the reason that, besides keeping up the supply of ordnance stores of the old vessels, the ordnance outfits of the new vessels, after the latter are commissioned and receive their original allowance, have to be replenished from this appropriation.			
<b>REPAIRS, ORDNANCE.</b>			
Necessary repairs to ordnance buildings, magazines, gun parks, boats, lighters, wharves, machinery and other objects of the like character (appropriated; act July 19, 1892) .....		30,000.00	30,000.00
<b>CONTINGENT, ORDNANCE.</b>			
Miscellaneous items, viz: Freight to foreign and home stations; advertising; cartage and express charges; repairs to fire engines; gas and water pipes; gas and water tax at magazines; tolls; ferrriage; foreign postage and telegrams to and from the Bureau and incidental expenses attending inspections of ordnance material (appropriated; act July 19, 1892) .....		10,000.00	8,000.00
<b>ARMING AND EQUIPPING NAVAL MILITIA.</b>			
Arms and equipments connected therewith for naval militia of various States under such regulations as the Secretary of the Navy may prescribe (appropriated; act July 19, 1892) .....		50,000.00	25,000.00
<b>CIVIL ESTABLISHMENT.</b>			
—ward, Portsmouth, N. H.: —ter, when required (appropriated; act July 19, 1892) .....	500.00		
—ward, Boston, Mass.: —ter, when required (appropriated; act July 19, 1892) .....	500.00		
—ward, New York: —rk (appropriated; act July 19, 1892) .....	1,400.00		
—rk, Washington, D. C.: —rk (appropriated; act July 19, 1892) .....	1,600.00		
—rk (appropriated; act July 19, 1892) .....	1,200.00		
—rk (submitted) .....	2,500.00		
—rk at \$1,017.25 each (appropriated; act July 19, 1892) .....	2,034.50		

*Estimates of appropriations required for the service of the fiscal year ending June 30, 1894, by the Bureau of Ordnance, Navy Department—Continued.*

Detailed objects of expenditure, and applications.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1893.
CIVIL ESTABLISHMENT—continued.			
Navy-yard, Washington, D. C.—Continued.			
One draftsman (appropriated; act July 19, 1892) .....	\$1,800.00		
Three draftsmen, at \$1,081 each (appropriated; act July 19, 1892) .....	3,243.00		
One assistant draftsman (appropriated; act July 19, 1892) .....	772.00		
Two foremen, at \$1,500 each (appropriated; act July 19, 1892) .....	3,000.00		
Two copyists, at \$720 each (appropriated; act July 19, 1892) .....	1,440.00		
One telegraph operator and copyist (appropriated; act July 19, 1892) .....	900.00		
Navy-yard, Norfolk, Va.:			
One clerk (appropriated; act July 19, 1892) .....	1,200.00		
Navy-yard, Mare Island, Cal.:			
One writer (appropriated; act July 19, 1892) .....	1,017.25		
Naval proving grounds:			
One writer (appropriated; act July 19, 1892) .....	1,017.25		
Torpedo Station, Newport, R. I.:			
One chemist (appropriated; act July 19, 1892) .....	2,500.00		
One clerk (appropriated; act July 19, 1892) .....	1,200.00		
One draftsman (appropriated; act July 19, 1892) .....	1,500.00		
		\$29,824.00	\$26,824.00
TORPEDO STATION.			
For labor, material, freight and express charges; general care of and repairs to grounds, buildings, and wharves; boats; instruction; instruments; tools; furniture; experiments, and general torpedo outfits (appropriated; act July 19, 1892) .....		50,000.00	60,000.00
INCREASE OF THE NAVY, ARMOR AND ARMAMENT.			
Towards the armament and armor of domestic manufacture, for the vessels authorized by the act of Aug. 3, 1886; of the vessels authorized by section 3 of the act approved Mar. 3, 1887; of the vessels authorized by the act approved Sept. 7, 1888; of the vessels authorized by the act approved Mar. 2, 1889; of those authorized by the act of June 30, 1890; of the one authorized by the act of Mar. 2, 1891; and of the vessels authorized by the act of July 19, 1892 (appropriated; act July 19, 1892) .....		2,000,000.00	2,000,000.00

NOTE.—The above estimate adds one chemist at \$2,500 for the Washington navy-yard.

Respectfully submitted

WM. M. FOLGER,  
Chief of Bureau.

SEPTEMBER 1, 1892

OFFICE OF INSPECTOR OF ORDNANCE,  
Hartford, Conn., October 1, 1892.

SIR: In obedience to the Bureau's orders, I have the honor to submit the following report of the development of the manufacture of ordnance material within the inspection district intrusted to my control.

The following is a list of the principal material under orders wholly or in part completed since March 26, 1890:

HOTCHKISS R. F. G.

Light 1-pounders .....	10
Heavy 1-pounders .....	53
3-pounders .....	34
6-pounders .....	142
37-millimeter .....	32

## DRIGGS R. F. G.

Heavy 1-pounders.....	15
3-pounders.....	10
9-pounders.....	115

Accessories and spare parts for both Hotchkiss and Driggs R. F. G.

## AMMUNITION.

1-pounder A. P. loaded rounds.....	36,000
3-pounder A. P. loaded rounds.....	18,900
6-pounder A. P. loaded rounds.....	22,000
1-pounder common loaded rounds.....	40,008
3-pounder common loaded rounds.....	19,784
6-pounder common loaded rounds.....	23,330
1-pounder common shell.....	18,869
6-pounder common shell.....	38,125
1-pounder cartridge cases (light).....	8,070
1-pounder cartridge cases (heavy).....	31,000
47-millimeter cartridge cases.....	5,000
Inside base fuses.....	6,098
Outside base fuses.....	5,994
47-millimeter common shell.....	10,000
6-pounder A. P. shell.....	21,397
6-pounder cartridge cases.....	5,172
6-pounder cartridge cases (field).....	3,000
4-inch cartridge cases.....	15,000
5-inch cartridge cases.....	5,000
Driggs fuses.....	10,000
4-inch steel common shell.....	5,000

The following is a list of the portion of the above material inspected and accepted since March 26, 1890.

## HOTCHKISS R. F. G.

Heavy 1-pounders.....	53
3-pounders.....	18
6-pounders.....	93
37-millimeter R. C.....	10

## DRIGGS R. F. G.

6-pounders.....	23
-----------------	----

Accessories and spare parts for both Hotchkiss and Driggs R. F. G.

## AMMUNITION.

1-pounder A. P. loaded rounds.....	20,000
3-pounder A. P. loaded rounds.....	13,900
6-pounder A. P. loaded rounds.....	12,012
1-pounder common shell.....	18,869
47-millimeter common shell.....	10,000
6-pounder common shell.....	38,125
6-pounder cartridge cases.....	5,172
6-pounder cartridge cases (field).....	3,000
4-inch cartridge cases.....	7,576
4-inch steel common shell.....	505
1-pounder common loaded rounds.....	21,600
3-pounder common loaded rounds.....	5,884
6-pounder common loaded rounds.....	14,271
1-pounder cartridge cases (light).....	8,070
1-pounder cartridge cases (heavy).....	31,000
47-millimeter cartridge cases.....	5,000
Inside base fuses.....	6,098
Outside base fuses.....	5,994
Driggs fuses.....	10,000

aneous shipments, Lee rifles and appendages, and revolvers  
 shipments to the amount of about \$15,000; in the aggregate to  
 e of about \$550,000.

The cost of inspecting this material has been about as follows:

Salary of inspector (ensign on "other duty"), two years and ten months, at \$1,200 per year.....	\$3, 400
Traveling expenses of inspector.....	3, 000
Miscellaneous expenses of inspection.....	100
Aggregate amount paid to subinspectors, ten in all, employed at various times.....	10, 000
Total cost of inspection, two years and ten months.....	16, 500
Percentage cost of inspection, 3 per cent.	

The majority of manufacturers in this district can be depended upon to make every reasonable effort to supply, even without Government inspection, nothing unserviceable. Entirely apart, however, from the unadvisability of discriminating between contractors in the matter of inspection, the additional assurance of excellence resulting from inspection on the part of the buyer is believed to be quite worth the cost thereof, and where material made by different contractors is required to interchange it is essential that the requirements in this regard be enforced through a representative of the Bureau.

The requirements of the Bureau in regard to material have resulted in the establishment or development of the following plants:

(1) Pratt & Whitney Company, Hartford, Conn.—Hotchkiss rapid fire guns and revolving cannon.

The maximum capacity of this plant under ordinary conditions of labor is about 100 6-pounders or 300 heavy 1-pounders per annum. With the addition of one ordinary 19-inch engine lathe for chambering 1-pounders, the capacity of the plant would be the sum of its capacity for 6-pounders and 1-pounders, or 100 6-pounders and 300 1-pounders per annum. The shrinking pit at this shop is worthy of notice in that it differs from the usual type and has a capacity of about 10 6-pounders per diem. This firm made its own machinery.

The date of the first contract with the Hotchkiss Company is December 2, 1887. The first 6-pounder was shrunk in on May 13, 1889. The last of the 30 6-pounders on this contract was delivered on September 22, 1890. Adding one month for preparation for shrinking first gun, this would be at the rate of 30 6-pounders in about seventeen months from beginning of work. Three-pounders, light 1-pounders, and 37mm. H. R. C. were being made at the same time.

The contract referred to above consisted of 32 37mm., H. R. C., 10 light 1-pounders, 22 3-pounders, and 30 6-pounders, and was entirely completed by the above-mentioned delivery of the last 6-pounder, about two years and ten months from date of contract with the Hotchkiss Company, after which date the subcontract was made, plant designed and set up, forgings ordered and delivered, and work begun. Whatever delay there was in the completion of this contract was mainly due to the late delivery of forgings. On subsequent orders the delivery of forgings has been more prompt and it is understood that the steel-makers' plants have been so increased as to make delay from this cause unlikely in the future.

By constant improvement in the management of the plant the last 50 6-pounders were completed in ten months from beginning of work thereon, or at about three times the rate of the first 30 6-pounders. Heavy 1-pounders were made at the same time with the last 50 6-pounders.

The firm of subcontractors, as well as the contractors themselves, the Hotchkiss Company, are continually trying not only to improve

the process of manufacture but the guns themselves. Though contemplating a radical change in the details of breech mechanism, they have, while awaiting decision on the new design, made every effort to perfect the old, so that it is safe to say that every lot of five guns delivered in the last two years has had some specific point of superiority over the previous five.

Perhaps the greatest improvement made in the gun has been in the extractor. The original Hotchkiss extractor, having been designed for wrapped cases, was hardly strong enough for the case now in use, and quite a number were broken in service. The old standing claw has been replaced by a detachable claw with enough spring effect to relieve the first shock of extraction. The most brutal treatment in the gun failed to injure an extractor made in this way.

Upon the demand of the Bureau the cranks and handles have, by a very convenient device, been made interchangeable.

A new sight has also been substituted for the very slow Stuart sight formerly in use on these guns. Most of these improvements have originated with Mr. Parkhurst, the superintendent of the gun department of the Pratt & Whitney Company.

The above-mentioned new design of Hotchkiss breech mechanism contemplates the following principal changes: The use of spiral springs alone; a cheap, very convenient, and substantial firing point; improved stop bolt and face plate. Care has been taken that no departure from the original design shall be of such a character as to prevent the interchangeability of *assembled* block and mechanism with *assembled* block and mechanism of design in use with guns already in service.

Though the new design for 1-pounder has been tried under service conditions, no special test has yet been made.

(2) Cramp's Steamship and Engine Building Company, Philadelphia, Pa.—Driggs-Schroeder rapid-fire guns.

With the addition of one machine for lapping finish bores the maximum capacity of this plant could be very nearly two hundred 6-pounders per annum. Though it appears to be steadily improving, the management is, as yet, not such as to produce guns nearly in this proportion.

No opportunity has yet been afforded to judge of the capacity of this plant for other than 6-pounders.

The plant was originally collected by the Colt's Patent Fire Arms Company, and with the exception of the elaborate special machinery required for breech of Driggs guns, most of the plant was made by the Pratt & Whitney Company, and was, in general, similar to the one in use for Hotchkiss guns. Upon its transfer to Cramp's the plant was enlarged about 50 per cent and its capacity increased in a somewhat less degree. Most of the added machinery was supplied by the Pratt & Whitney Company.

In beginning the work at Colt's there was substantially no delay from slow delivery of forgings, but considerable delay resulted from the halting manner in which the original design was prepared for use, delay in the transmission to sub-contractors, and an apparent desire on the part of the middlemen to have the specifications accorded to that design.

The first order for guns was dated about October 11, 1889.

The first 6-pounder was shrunk in about April 1, 1891.

By the manufacture of the Colt Company eight 6-pounders were delivered by December 10, 1891. The transference of the plant to Cramp took place shortly afterwards and the two remaining 6-pounders

on first order were shrunk in and finished, being delivered on June 25, 1892, or at the rate of ten guns in nearly fifteen months, including transfer of plant, or eight guns in about eight months.

This would be, then, ten 6-pounders in two years and eight months from date of order.

During this period work on other calibers was insignificant. Since the delivery of the first ten 6-pounders thirteen guns on subsequent orders have been prepared for delivery and have been awaiting the selection of a sight.

Work on these thirteen guns was begun about March 1, 1892. Some work had, however, been done on jackets and tubes before transfer of plant from Colt's. This would then be, roughly, thirteen guns in six months, which shows some improvement with increased plant.

Attempts from time to time on the part of sub-contractors to improve the design of the gun have been discouraged by the contractors, so that, except in a few minor particulars, the gun is substantially as first designed. The principal improvement has been to take advantage of the presence of shoulder-bar on right side of gun, to attach to it the pistol grip. This has not yet been thoroughly tried, but would seem to be a very excellent improvement, at least with recoil mounts.

Whatever may be the merits or demerits of the Driggs system, the present complicated, inconvenient, and somewhat "close" design is much to its prejudice. As far as "closeness" is concerned, however, the system itself sets a small limit on "freedom" of design and workmanship.

Very little has been done on the 3-pounders ordered October 11, 1889, and 1 pounders ordered September 6, 1890.

The workmanship on both Hotchkiss and Driggs guns has been excellent, and seems to be in every respect superior to that on guns of the same general types made abroad. Unusual steps have been taken in every case to insure interchangeability of mechanism, and it is believed that the mechanism of both Hotchkiss and Driggs guns, at least since January, 1891, will freely interchange in guns of the same kind and caliber.

During the time covered by this report the length of bore of 6-pounders has been increased to about 40 calibers and the heavy 1-pounder of 40 calibers length of bore, charge about 125 grams black powder, has been substituted for the light 1-pounder of 20 calibers length of bore and charge of about 75 grams of black powder. The projectile is the same for both guns.

Among the new rapid-fire guns and designs therefor the most noteworthy is the Sponsel gun, the invention of Mr. Sponsel, of the gun-assembling shop, Pratt & Whitney Company. The performance of this gun on preliminary trial was excellent, both under normal conditions and with defective cartridges prepared with a view to putting the mechanism of the gun under the greatest possible disadvantage.

One of the most excellent *mechanical* features of this gun is the cheapness with which it can be made.

In the design and manufacture of rapid-fire guns it seems as though nowhere had any great attention been directed to selection of sights of a design adapted to the service conditions under which it is supposed with reason that these guns will usually be used. The fact does not seem to have been much emphasized that, in order of importance, the conditions to be realized by a sight for rapid-fire guns differ considerably from those to be realized by a great gun sight.

At present there are several kinds of rapid-fire gun sights in service.

Perhaps the most inappropriate is the Stuart sight, supplied with the first Hotchkiss guns, and the most appropriate the Parkhurst sight, supplied with the later Hotchkiss guns.

In order to rapidly change the elevation of the Stuart sight to any great extent the entire attention of the operator is required. A noticeably bad feature which this sight has in common with others is the comparative immobility of the sliding leaf. As this leaf must always be set by trial, if it is to be conceded that the leaf is of any service whatever, the condition in which rapid-fire guns are supposed to be most useful would seem to demand that the sliding leaf should be susceptible of instant movement for its entire length.

There are also in service several kinds of sight "notches," varying from the ordinary notch and point to double cross wires, suitable for accurate and leisurely shooting from fixed platforms. It seems as though in transferring men from ship to ship some confusion might result from such an arrangement and the value of the previous training of a marksman would be greatly reduced when applied to a kind of sight notch differing radically from the kind with which the training took place.

Accordingly, with a view to secure a uniform sight for all the smaller calibers of these guns of whatever pattern, it is hoped that there may soon be presented for the Bureau's examination a design of sight which will most nearly fulfill the conditions required with a rapid-fire gun.

(3) The Winchester Repeating Arms Company, New Haven, Conn.—Cartridge cases for 4 and 5 inch calibers and Hotchkiss ammunition of all kinds.

This plant is suitable for the manufacture of built-up cases up to 6-pounders and of solid-drawn cases of any size to 6-inch caliber. With slight alteration of drawing plant and the addition of a lathe for machining heads, the plant could be made to include the manufacture of 8-inch cases.

The following is the maximum capacity of the plant in detail:

*Details manufactured.*

	Number per diem.
1-pounder built-up cases .....	400
3-pounder built-up cases .....	200
6-pounder built-up cases .....	200
1-pounder solid cases (light) .....	300
1-pounder solid cases (heavy) .....	250
3-pounder solid cases .....	150
6-pounder solid cases .....	150
4-inch solid cases .....	50
5-inch solid cases .....	30
4 and 5 inch primers and pockets .....	1,000

*LOADING.*

1-pounder light rounds .....	500 to	600
1-pounder heavy rounds .....	400 to	500
3-pounder rounds .....	250 to	300
6-pounder rounds .....	250 to	300
1-pounder common shell .....		250
3-pounder common shell .....		200
6-pounder common shell .....		200
1-pounder A. P. shell .....		200
3-pounder A. P. shell .....		150
6-pounder A. P. shell .....		120
base fuses .....		300
base fuses .....		300
base fuses .....		300
gun primers .....	2,000 to	3,000



With the single exception that 4 and 5 inch cases can not be made at the same time, the capacity of the plant is represented by the *sum* of the above details. Three pounder and 6-pounder ammunition can not be *loaded* at the same time. The preparation for this, however, would be small, and, if necessity should arise, would probably cause no delay.

At the beginning of the contracts and subcontracts with this company doubt was expressed as to the advisability of attempting solid drawn cases, even for the smaller rapid-fire guns. A short experience has, however, so developed the manufacturing methods, that all future orders will be given for solid drawn cases, and such cases have already been delivered in large numbers by both this and the Union Metallic Cartridge Company.

The principal difficulty experienced in the manufacture of large cartridge cases is to obtain enough elasticity of metal to secure easy extraction. With the difficulty of uniformly, hardening, by mechanical means, any great thickness of brass the manufacture of cases of large caliber becomes a compromise between obtaining thickness enough to give the necessary strength with a given hardness and thinness enough to secure by the operations of drawing the necessary hardness.

The problem of manufacturing 4-inch cases has been brought by this company to a successful issue, and since the original order was given on July 18, 1890, the plant has been designed and established, the cases developed, and over 7,000 have passed the required tests and been delivered.

On January 6, 1892, an order was given this company for 5-inch cases, and on April 30, 1892, a trial lot of fifty cases were tested with exceptional success.

The manufacture of 6-inch and 8-inch cartridge cases is now under consideration.

The Winchester company have experienced little difficulty in fulfilling the subcontracts so far given for Hotchkiss cartridge cases, primers, and fuses, and have now completed all orders *except* a portion of those for 6-pounder A. P. shell.

The fuse has been improved from time to time so that its action is extremely uniform and a pressure of over 260 pounds is required to arm it, as opposed to 60 pounds with the first fuses. In the application of explosives this company leans strongly toward securing safety: the fuse detonators being made as insensitive as the conditions of bursting test will permit.

Some difficulty was experienced at first in casting common shell, but this was overcome, and, as stated above, the deliveries of this detail are completed.

With the A. P. shell there has been the same difficulty here as abroad in securing normal perforation of test plate at the required range.

All the shell presented for proof have appeared to be structurally fully up to the requirements, and when tried in competition with shell of same caliber made in France proved themselves much the better shell.

The 1-pounders, as do usually the 3-pounders, remain unbroken whether plate is perforated normally or otherwise, but in the case of the 6-pounders oblique perforation not infrequently results in breaking the shell, though all parts pass through the plate. The oblique perforation referred to is that alone which takes place with line of fire normal to plate. It seem probable that the ingenuity of the manufacturers in

this country will overcome this difficulty, and, in fact, mechanical devices of a practical nature have already been introduced and found successful in securing normal perforation at the shortest range; while in some cases abroad, the attempt to secure normal perforation at the required range has been relinquished and the specifications have been changed to require that all parts of the shell, whether broken or not, shall pass through the test plate at 100 yards. This decrease in the severity of the specifications is deemed extremely ill-advised and, in fact, would not be requested by the contractors at present engaged in the work here.

Though there was difficulty at first in securing satisfactory tests of bursting of A. P. shell, the difficulty seems to have been entirely overcome, and in a manner comparing very favorably with that in many cases used abroad.

In addition to the above contracts the Winchester company have made many minor experiments for the Bureau of Ordnance, and supplied many of the special devices used in tests of cartridge cases and smokeless powder.

(4) The Union Metallic Cartridge Company, Bridgeport, Conn.—Cartridge cases and primers ordered through Driggs company; Driggs fuses and loading of rounds for Driggs company.

With the single exception that this company has not made its own metal, this plant has a capacity about as follows:

<i>Details manufactured.</i>	<i>Number per diem.</i>
1-pounder light cartridge cases.....	600
1-pounder heavy cartridge cases.....	500
47 millimeter cartridge cases.....	50
3-pounder cartridge cases.....	50
6-pounder cartridge cases.....	50
6-pounder field cartridge cases.....	50
Fuses.....	200

#### LOADING.

3-pounder rounds.....	50
6-pounder rounds.....	50

These figures show the number of each detail which can be produced if no other is being made at the same time. Either one of the three smaller cases can, however, be made at the same time with either of the two larger ones and the capacity for manufacture of fuses is not dependent upon that of any other detail. The loading plant can be at any time increased without important delay.

The proximity of brass rolling companies on a large scale enables a firm to readily obtain the required metal.

The cartridge cases made here are of good design, solid drawn, and workmanship thereon is of a character seldom exceeded.

The fuse made by the company is excellent in principle and of fairly good design. The workmanship is exceptionally fine and the performance of the fuse good.

In spite of the well-known deterioration of spring brass through of time when continually at rest and of the ample demonstration of structural weakness a brass spring was embodied in the original of this fuse. Through the insistence of the subcontractors, a steel spring of excellent quality has been substituted with a corresponding improvement in the performance of the fuse.

Adaptation at the use of steel spring seems in a small degree to

have been due to fear of galvanic action. Though no exhaustive experiments have been made in the case, it seems that this fear is unfounded even for the most remote contingencies. A standard fuse immersed for eighteen months in salt water showed on test no deterioration whatever, either in character of spring or attachment of same to screw cap.

This company has been delayed from time to time in its production through lack of proper guns for experimenting.

(5) The Cramps' Steamship and Engine Building Company, Philadelphia, Pa.—Projectiles for Driggs Company.

The nucleus for the plant for 3 and 6 pounder A. P. shell was formed at the Simonds Rolling Machine Company, of Fitchburg, Mass.

Since transference to Cramps' steps have been taken to improve and increase the machining plant and it has been made to include 1-pounders. No opportunity has yet been afford to properly gauge the capacity of this plant, for of the 5,000 6-pounder and 5,000 3-pounder A. P. shells ordered in November, 1889, none have yet been presented for inspection.

Such experiments as have been made from time to time seem to give a reasonable hope that, when brought to the test for perforation, the shell will prove satisfactory. Nothing is as yet known as to the adequacy of their design to secure proper burst.

The plant for 1-pounders, 6-pounders, and 47-millimeter common shell was collected by the Pratt and Cady Co., Hartford, Conn., in consequence of orders given them by the Driggs Company, amounting in all to about 15,000 6-pounders.

The bureau afterwards ordered from them directly 1-pounders, 6-pounders, and 47-millimeter common shells to the extent of about 52,000 of all calibers, the deliveries of which were completed in about nine months from date of first order therefor. Ordering directly from the manufacturers resulted in a saving to the bureau of not less than 15 per cent in the price of these shells.

The Pratt and Cady had, at first, the usual difficulty in casting shell and to the same extent, but they overcame it with unusual readiness and at the end of their contract the plant was worked almost to its maximum per diem capacity of:

1-pounder..... 300 47 millimeters..... 150 6-pounders..... 200

The shell produced were of unusually good quality.

As stated above the plant has been transferred to Cramps and preparation is being made to include in its scope 3-pounder common shell, 5,000 of which were ordered of the Driggs Company in November, 1889.

(6) The American Projectile Company, Lynn, Mass.—Four-inch and 6-inch steel common shells and 6-pounder A. P. Shell.

The object of the design of these steel common shells is to obtain a shell of large mine effect with strength enough to perforate any probable gun shield at fighting ranges.

The advantages of these shell over cast-iron common shells is not enough to warrant a very great increase in price over the latter and, therefore, they only become desirable when the method of manufacture is inexpensive. In the case of the 4-inch shells these conditions have been fully realized and they have, both in design and manufacture, passed the experimental stage. Some difficulty was at first experienced in keeping the dimensions within suitable limits. The difficulty was due mainly to the fact that the drawn tubing provided was not as thick as subsequent experiment showed to be necessary. The difficulty has been entirely overcome and the dies for closing-in have been so designed

as to reduce to a minimum the variation in dimensions due to wearing, and the cost of their readjustment.

The manufacture has been so well systematized that it is reasonable to expect the early achievement of the maximum capacity of 200 4-inch shells per week. Five hundred have already been delivered and 1,000 more await result of proof test at Indian Head.

The 6-inch steel common shells are still in an experimental stage.

With the 6-pounder A. P. shell, here as well as elsewhere, difficulty has been experienced in regard to normal perforation at very short ranges, and the difficulty bids fair to be overcome in very much the same way as at Winchester. Through experiments in penetration with these shell have, as yet, by no means been complete, the few that have been made seem to emphasize the advantage gained by the use of different steels for head and base, made commercially practicable by the application of electric welding.

No experiments in bursting 6-pounder A. P. shells have been tried. If they fulfill the present expectations the chances seem to be in favor of a considerable reduction in the price of A. P. shells generally.

The application of electric welding to projectiles and the development of the process are due in the main to Lieut. W. M. Wood, of the Navy, who is manager of the company.

The shells heretofore manufactured by and those now under contract to various makers are of several different general forms.

In order to insure uniform ballistic qualities, in accordance with the Bureau's orders, steps have been taken to establish standard forms for all makes of shell for rapid-fire guns of calibers from 6-pounders downward. These standard forms will be so designed that, while securing the desired uniformity in ballistic qualities, as much latitude as possible will be given to the makers for the attachment of any special or patented device as may be believed to be of advantage to the Bureau.

The space available for such device will be fully indicated upon the drawings of this design.

In order to make the assurance of interchangeability of different makes of ammunition details depend as little as possible upon the judgment of either contractors or inspector, steps are being taken to arrange for the establishment of standard master gauges for the points in question as, for example, fuses and fuse-hole threads.

(7) The Colt Patent Fire Arm Manufacturing Company, Hartford, Conn.—Revolvers and gatling guns.

There have been very few orders filled by this company since March 26, 1890. The capacity of this plant for .38 caliber new Navy D. A. revolvers is about 100 per diem, but their facilities are such that this output can be doubled at once in case of need. Time enough has now elapsed since its introduction to get a fair idea of the performance of this revolver. The principal defect of design lies in the fact that the cylinder does not lock with hammer rebounded, so that, when revolver is at rest, the cylinder is free to turn accidentally. This makes it very possible, perhaps at a critical moment, to snap the hammer on an already fired cartridge.

It is understood that this revolver, having passed the competitive trial of U. S. Army, has been adopted in a modified form for the cavalry.

Part of the modification at least is good and effectually removes the danger of cylinder turning while revolver is at rest.

With the first contract for the Navy pistol, were delivered a number loading packs, their purpose being to load all the chambers at one on. The principal objection to these packs lies in the fact that it

is intended to retain instead of discard the packs when empty. The desirable feature of simultaneous loading of all chambers seems likely to have a much greater influence in the transition from revolvers to magazine pistols than any ballistic consideration. The pistol being essentially a weapon for close quarters, it is believed that however desirable may be increased ballistic quality, it is a consideration of less importance than facility of loading. At present it seems as though, for mechanical reasons, facility of simultaneous loading, could be more easily obtained in a magazine pistol than in a revolver; and there are already under consideration abroad several magazine pistols susceptible of being loaded in one motion and far from complicated. It seems likely that in the near future the revolver will be superseded by the magazine pistol loaded by cartridges in packs assembled at the factory.

This firm has for many years been the subcontractor for the Gatling Gun Company, but the continual changes made in the detail of this gun and the small number of each kind ordered have made it unprofitable to establish a complete plant for their sole manufacture.

In the matter of weight and speed of fire the following tactical considerations have generally been applied to the examination of machine guns here:

*For use in fixed positions on shipboard, or under any other circumstances of adequate ammunition supply, the speed of fire can not be too great. On account of the probable intermittent character of the fire and its small duration, this is especially the case on shipboard.*

In machine guns for this service, within the limits of any possible design, the weight need not be considered.

*For use with landing party or naval brigade, within the limits of any possible design, the gun can not be too light.*

Owing to the uncertainty of obtaining draft animals and the decrease in effective force resulting from the substitution of men therefor, the weight of the gun and its ammunition together would be limited by the number of men it would, under ordinary conditions, be prudent to devote to their transportation and service. The supply of ammunition, moreover, should be great enough to provide for the maximum aggregate duration of fire likely to be required before communication with depot.

With a given weight of gun, then, the maximum speed of fire permissible would be determined from these two considerations, and would be such as to make the transportable weight of cartridges represent the required duration of fire. Tactically considered, then, the lighter the gun the greater can be the speed of fire.

For the lower limit it is, in the light of tactical and mechanical experience combined, generally considered desirable to have a speed of fire not less than 400 per minute, but the use of a machine gun for landing would still be of advantage at speed of fire considerably less than even this. If either the weight of the gun or its speed of fire is so great as to defeat the conditions stated above, it is believed that the gun should not be landed unless circumstances are such as to permit it for the time being to be safely deserted when ammunition is gone.

From considerations of endurance and accuracy of gun, as much as possible of the permissible weight of gun should be devoted to multiplying the barrels, although under the conditions both governing the speed of fire and likely to be realized in a landing gun no trouble would under ordinary conditions arise from the use of a single barrel.

In the matter of feeds, the attention of the inventors is being directed to eventually securing for machine guns a "positive" feed for which

the ammunition will be packed at the place of manufacture, and if possible in the same form in which it is to be used in the infantry arm. It seems likely that with certain forms of small arm loading packs, this will soon be realized and the feed for machine guns becomes a succession of loading packs readily separable for use in small arms. The automatic principle is also rapidly coming to be considered an essential feature of machine guns.

Of the guns now in general use the conditions stated above for ship-board guns seem best realized by the Gatling gun, for which the automatic principle is obtained by the application of electric motor.

In the first motor tried in September, 1890, the contractors therefor confined themselves to barely complying with terms of contract, and made no attempt to demonstrate the adaptability of a motor to the uses of general service. Enough, however, was accomplished to show that the motor could be readily made adaptable to service conditions and another firm, the Eddy Electric Company, of Windsor, Conn., has already made a design for such a motor, for the trial of which the preliminary steps have already been taken.

An idea of the possibilities of the motor may be obtained from the following quotation from the report of the trial (my No. 111, of October 4, 1890):

At extreme elevation a case was emptied in five seconds (1,248 per minute). The rate at level did not differ perceptibly from that at extreme elevation. With skillful manipulation it would be safe to say that from 900 to 1,000 shots per minute could be sustained until exhaustion of filled cases.

The speed of fire of the gun, sustained for a time greater than that represented by the contents of one feeding device, is generally limited by the rapidity with which the empty case, or other device, can be replaced by a full one, and for longer durations, by the time required to refill the feeding devices. This ceases to be the case with a positive feed directly from packages made up at the cartridge factory which, when emptied, are automatically disposed of by the gun.

There are several such feeds already in use, and it is such a feed as this that the Colt Company contemplates applying to any Gatling to be made by them.

In regard to the question of a gun for landing:

Heretofore, guns which have approached the conditions stated above as necessary to such service have usually been either very complicated or fragile, or both, and where they have been sufficiently strong and simple have generally shared so largely the disadvantages of the Gatling for this service that it has not appeared advisable to provide the service with both guns.

Very recently, however, a very strong and simple automatic gun has been invented which can be made to fulfill the stated conditions to any desired extent. This gun may be said to be just emerging from the experimental stage, and it is expected that the Colt Company will soon be able to present one for official trial. Should the Gatling selected from the several types now under consideration be finally made by the Colt Company, it seems likely that the Bureau will be able to secure that company machine guns of a maximum efficiency for both ship- and naval brigade, both with the same feed, one gun with great of fire and the other with small weight.

question of arranging these feeds for the use of small arms pack under consideration.

obedience to the Bureau's instructions, attention has been directed subject of small arms generally and many arms of both domestic

and foreign invention and manufacture have been examined and tried. Recent discoveries and experiments have demonstrated fully the necessity for a reduction of caliber, and these examinations and trials have been made with a view of taking advantage of this necessity to substitute a magazine and breech mechanism of the most advanced type for those at present in service.

Under the stimulus of a similar condition abroad and the resolution of the U. S. Army to substitute a magazine arm for the single loader now in use, inventors all over the country are turning their attention to the question of magazine arms.

Far from being ripe for the production of any arm, this agitation among the inventors is in its infancy. Interest enough, however, seems to have been developed to lead to the expectation that in a year or two an arm may be produced thoroughly up to the modern ideas and superior in every way to the excellent European arms, such as that for the German infantry and the latest designs of Mannlicher and Mauser, which may deservedly be considered as standard arms of the day.

The attempt to reduce to a science the question of the control of fire from bodies of men is of comparatively recent beginning, and the usual conservatism of military authorities generally seems to have prevented an early appreciation of the great assistance to be derived from a proper application of the magazine to this end, resulting in an increase of true economy in the expenditure of ammunition. Moreover, the time required to charge the early military magazines tended to still further crystallize the adherence to the idea that the single loader is the normal condition and the use of the magazine is for emergencies and crises alone.

The application of this attitude leads, as in the single-breech loader, to attempts to control fire by the uneconomical use of volleys at unsuitable times, and to attempts to economize ammunition by increased time of loading, with time for aiming correspondingly reduced, a method which seems to make itself severely felt with the short periods of duration of fire likely to be employed in attack.

The demands arising from ideas such as these are well met by such magazine arms as the one in use in the Navy for the last ten years and the one said to have been recently adopted for use in the Army.

A system of tactics for any weapon must be so devised as to bring out the best points of the weapon, and as far as possible to compensate, by the manner prescribed for its use, for whatever weak points the weapon may have. The principal requirements of the tactics have been decided upon to this end, the details of the arm should be so modified as to, as far as possible, assist mechanically the execution of these requirements.

Considerations of fire control are so much more important, and the difficulties of its execution so much greater with the attack than the defense, that such features of an arm as are intended to assist this control have been adapted almost solely to the conditions of attack. The facility with which modern magazines are charged, however, makes the device adopted equally efficient in defense, which, as far as fire control is concerned, is substantially the attitude of small arms when used on board ship.

The arm recently adopted for the German infantry seems to have been selected on some such considerations as these, with the primary idea of assisting the control of fire as much as possible by mechanical means. The same general considerations seem to have governed the preparation of the "Instruction for Infantry and Artillery, U. S. Navy,

• • • 1891" (see Art. 327, p. 90), than which it would be difficult to imagine any better adapted to the arm to the use of which it applies.

Though the present German arm insures well the regulation of fire up to the time of last halt or of the final uncontrolled fire, it falls short of the ideal in that it necessitates during this final fire enough coolness on the part of the men to reload. This difficulty would be removed if the magazine were of such a nature that at the last halt it could be made to hold some multiple of the pack of cartridges used in the previous advance.

This, to be effective, would have to be accomplished without requiring any new motions on the part of the individual, or, at most, nothing more than a repetition of the usual motion of loading. More than one magazine of this kind is now already under consideration among inventors, and one has already reached an advanced stage of experiment and should before long be presented to the Bureau for preliminary examination.

It may be imagined, and is generally conceded, that conditions do arise when it is extremely desirable to be able to fire without removing the arm from the shoulder. Though this may be accomplished more or less awkwardly with many arms already in use, it has given rise to the desire for a straight pull bolt. The difficulty with bolts of this kind has usually lain in the weakness to resist recoil or the lack of power in the several operations incident to cocking, loading, and extracting.

There have recently, however, begun to be developed two very promising bolts of this description, one by Mr. Lee, the inventor of the arm now in use in the Navy, and the other by Lieut. White, of the marines.

Arms, the mechanism of which is operated by a lever, have not been generally considered as adapted to the uses of infantry. This is mainly on account of the inconvenience of handling in prone position or under small "cover." There are, however, several such arms in process of development, the progress of which will be duly observed.

In the matter of gun trimmings, as already reported (my No. 99 of January 28, 1892), the few experiments that have been made here with the steel barrel cover would lead to the substitution of wood for a part of the barrel's length. It is reported that the German barrel-covers were made by the new Manseman process.

The attention of the Bureau is respectfully directed to the cleaning-rod bayonet on last model Springfield rifle as worthy of trial. The lightness of this bayonet and manner of transportation permits the addition to a man's equipments of a tool purely for purposes of intrenchment. A few experiments have been made here with the bayonet, which seems to be amply strong.

In the matter of caliber, 6.5 mm. seems to be about the minimum limit which the state of the art of projectile and barrel making will now admit. When inventors produce a bullet which, while retaining the present ballistic qualities required, permits the use of rifling of increasing twist, then it seems likely that a still further reduction of caliber will be generally deemed advisable. No rimless cartridges for these small calibers have yet been seen here; but with their large powdery and consequent abrupt cone of powder chamber, the feature of a rimlessness would seem to be even more valuable with these than the larger calibers and straighter bullets.

As the difficulty in manufacture is concerned, cartridge metal so uniform in quality and machinery is so accurate that no whatever need be apprehended in the use of the rimless cartridge properly designed. This would seem to be well borne out by



European practice and experience, and, as for weakness, as far as is here known, this experience seems to show that the rimless cartridge gives out in about the same manner as that with the rim.

The regular manufacture by the Pratt and Whitney Company of gun machinery has resulted in their making a regular business of model making for small arms. The presence at their works of the principal office of inspection has, in consequence, had the power to result in considerable advantage to the Bureau in mechanical questions relating to small arms. The actual production here of large plants for the manufacture of European arms has been of advantage in the same way.

Except where their work has been of a confidential nature, this company has invariably supplied the Bureau or its representative with any information which they had in regard to the latest military material coming under their notice.

Very respectfully,

HAROLD H. EAMES,  
*Ensign, U. S. Navy, Inspector of Ordnance.*

The CHIEF OF BUREAU OF ORDNANCE,  
*Navy Department, Washington, D. C.*

BUREAU OF ORDNANCE,  
UNITED STATES NAVAL TORPEDO BOARD,  
*October 20, 1892.*

SIR: I have the honor to submit the following report of the operations of the Torpedo Board, organized under the orders of the Bureau of Ordnance, dated August 15, 1891, for the past year.

#### PATRICK TORPEDO.

The two torpedoes of this type that remained to be delivered under a contract made by the Honorable Secretary of the Navy and Mr. J. N. H. Patrick have been tested by the Board and accepted by the Department. A copy of the Board's report is appended hereto, marked "A."

#### ERICSSON SUBMARINE GUN AND PROJECTILES.

A series of tests of the submarine gun and projectiles constructed under a contract with the Ericsson Coast Defense Company have been made in the Erie Basin, Brooklyn, N. Y., and in the Simpson Dry Dock at the navy-yard, Brooklyn, N. Y.

A copy of the official report of those trials is appended hereto, marked "B."

The results of the experiments are such that, in the opinion of the Board, further tests should be undertaken with projectiles having greater strength in their after bodies to withstand the shock of expulsion. As an auxiliary to the ram, this system of under-water discharge, when perfected, will greatly increase the effective power of that weapon.

#### WHITEHEAD AUTO-MOBILE TORPEDO.

The delivery of any torpedoes of this type has been delayed by the difficulty that was experienced in obtaining air flasks of domestic manu-

facture. This difficulty has now been overcome and steel forgings of high quality have been delivered by the Bethlehem Iron Company and the Midvale Steel Company. The tests of the forgings, as well as the completed flasks, show characteristics considerably above those required from manufacturers abroad. Twenty torpedoes are now completed and are undergoing adjustment trials at the trial course in Little Peconic Bay, Long Island. A number of the torpedoes already completed should be presented for official test before November 1.

A large portion of the mechanism of the other eighty torpedoes is finished and the condition of manufacture is such that the completion of the torpedoes will quickly follow the delivery of forgings for air flasks.

It has been found impracticable to use aluminium bronze or manganese bronze for air flasks, as all made of those materials have failed to withstand the required tests.

The material used and the workmanship employed in the manufacture are of the highest order, and reflect the greatest credit on the contractors.

#### HOWELL AUTO-MOBILE TORPEDOES.

One torpedo of this type has been tested and accepted by the Department, but further official trials have been prevented on account of some changes in the details, which the contractors believe will materially improve the accuracy and efficiency of the torpedo. Continued experiments have been made by the contractors during the year, and they now have several torpedoes ready for official trial. These tests will be begun immediately by the Board and completed at an early date.

#### HALL TORPEDO.

A torpedo designed by Lient. M. E. Hall, U. S. Navy, has been manufactured at the torpedo station, but its completion has been delayed for the want of an air flask.

Two forgings, one of steel and one of nickel steel, have been procured from the Bethlehem Iron Company, and the former has been finished and found satisfactory upon test. The completion and test of the forging of nickel steel, it is believed, will demonstrate the superiority of that alloy for use in thin vessels, which are required to withstand high internal pressures without deformation.

#### TORPEDO-LAUNCHING APPARATUS.

*Whitehead.*—Ten launching tubes have been ordered for the 18-inch Whitehead torpedo and assigned to different types of mounts.

Three of these tubes have been delivered and installed on board the *Cushing*, one as a bow tube and two mounted on a turntable mount on deck. Each of the three has been tested by discharging from it a torpedo, and found to work satisfactorily.

The launching tube for torpedo boat No. 2 will be completed and ready for installation as soon as that vessel is accepted.

*Howell.*—Fifteen launching tubes for the 14.2-inch Howell torpedo are contracted for, and a number of them completed, but their acceptance is contingent upon the acceptance of the torpedo. Two of these tubes have been installed on board the *Stiletto*, one in the bow and one on deck on a central-pivot mount. Their efficiency has been

practically demonstrated by continued use in discharging the torpedoes during experimental tests.

*Mounts.*—Carriages for mounting and manipulating the torpedo launching tube of the Whitehead and Howell torpedoes have been designed to meet the requirements of the different locations on board ship, which it is believed will satisfactorily perform the service required. They are light, simple in construction, and can be rapidly manufactured and installed with little delay. Types of these mounts are now under construction at the Washington Navy-yard.

#### TORPEDO BOATS.

The *Cushing* has been fitted, under the immediate supervision of the Bureau of Ordnance, with three launching tubes for the 18-inch Whitehead torpedo and air compressor for charging, and means for handling and transporting torpedoes.

An armament of three 1-pounder rapid-fire guns has also been placed on board, and the vessel is ready in every respect for active torpedo service. She is at present engaged in experimental duty in connection with the tests of Whitehead torpedoes.

*Stiletto.*—The *Stiletto* has been fitted at the torpedo station, with the launching tubes for the 14.2-inch Howell torpedo. This vessel has been almost constantly occupied during the past year in connection with the experiments and tests of that torpedo.

*Torpedo Boat No. 2.*—The torpedo launching tubes and accessories for this vessel are now under construction, and will be ready for installation when the vessel is accepted.

#### INVISIBILITY OF TORPEDO BOATS.

Samples of colored paints used abroad for rendering torpedo boats as nearly invisible as possible have been received, together with a number of formula for mixing color for that purpose.

The *Cushing* has been painted with the color in use by the torpedo boats of the Argentine Republic, a sample of which was received from Commander R. B. Bradford, U. S. Navy, commanding U. S. S. *Bennington*. Some experiments with search lights have been made which tend to show that this color has a decided effect in decreasing the visibility of the object which it covers when compared with other colors in the vicinity at the time of trial. Further tests and comparisons will be carried out from time to time as opportunity offers.

#### FUEL FOR TORPEDO BOATS.

The use of petroleum as a fuel for torpedo boats has received considerable attention abroad, especially in Italy, and reports indicate that the experiments in that direction have been very successful. Among the advantages claimed for this kind of fuel are the following (weights being equal):

Radius of action greatly increased; greater convenience of stowage and no trimming necessary; greater facility of feeding fires and consequent decrease in the number of fire-room force; increased ability to control fires and subsequent generation of steam, especially in stopping or when necessary to increase speed for emergencies; absence of ashes and dust; less deterioration of boilers and tubes; absence of flame and sparks from smokestack, which would betray presence of boat at night.

The importance of this subject has led the Board to the request for stating the extent of the use of their launch as a torpedo school vessel in the United States, and it trusts that it is successfully employed to a large number of manufacturing establishments, and believes that it can be used in torpedo boats with great advantage. Further investigation on the subject will be made.

Desire to call the attention of the Bureau to the fact that all of the designs of the various mounts for torpedo tubes or tubes already built and now under construction are the work of Lieut. C. A. Bradbury, whose ingenuity and skill in overcoming the numerous obstacles presented is worthy of special mention and commendation.

Very respectfully,

GEORGE A. CONVERSE,

*Commander, U. S. Navy, President of Torpedo Board.*

Commander WEL M. FLEWER, U. S. Navy,

*Chief of Bureau of Ordnance.*

### A.

#### BUREAU OF ORDNANCE, NAVY DEPARTMENT,

*Washington City, November 2, 1891.*

SIR: The board appointed by the Bureau's order of August 15, 1891, has the honor to submit the following report upon the tests and trials of Pattern torpedoes Nos. 2 and 3:

The board assembled from time to time at Newport, R. I., and witnessed the trials of these torpedoes, which trials have been carried out in accordance with the instructions of the Navy Department issued November 14, 1889.

The conclusions of the board, following the order of the numbered paragraphs of the order or contract for the torpedoes, are as follows:

1. The capacity of the explosive chamber in both torpedoes is sufficient for the proper storage of more than 400 pounds of dynamite. The explosive chamber constitutes the forward section of the torpedo. It can be readily and safely removed from the torpedo for stowage in a magazine.

2. The axis of the torpedo and consequently the center of the explosive chamber is  $3\frac{1}{2}$  feet below the surface of the water when the torpedo is at rest or moving at a moderate speed. At high speeds, with the rudder amidship, the forward end of the torpedo lifts slightly. When the rudder is put either way the lifting of the bow of the torpedo increases and apparently at times rises as much as 1 foot.

3. Torpedo No. 2 on its speed trial ran 5,325 feet at a mean speed, indicating for currents, of 19.557 knots per hour, falling by 0.143 of a knot to make the contract speed of 20 knots per hour for 1 statute mile. Torpedo No. 3 on its speed trial ran 5,280 feet at a mean speed in perfectly still water of 21.78 knots per hour, making 1.78 knots above the contract speed of 20 knots per hour for 1 statute mile as required by the contract.

4. The speed for the first half of the run did not vary considerably from the last half in the trial of either of the torpedoes (Nos. 2 and 3). Both torpedoes were tested as to their maneuvering qualities and were found to be perfectly under control of the person manipulating the operating apparatus, being readily started, stopped, directed to port or to starboard, and operating to the entire satisfaction of the

The firing devices of each torpedo is safe and effective. Tests were made to demonstrate its reliability of action on contact normal to the plane of the target, and also at an angle of  $30^{\circ}$  therewith, and the results were entirely satisfactory. Each torpedo is supplied with two staffs, upon which flags or vanes can be carried by day and lanterns by night, to aid in observing the course of the torpedo while running.

5. In the opinion of the board, the shells, mechanism, and all other parts of the torpedo are constructed of materials best suited to the different purposes for which they are used, and amply strong, and the workmanship is of excellent character.

6. No opportunity has offered to test these torpedoes in a moderate sea, except in the speed trial of No. 2, when a fresh northwest wind was blowing, causing a moderate sea on the bow of the torpedo. There was no apparent effect, either upon the course or speed of the torpedo, or upon the ability to readily govern its movements by the person at the manipulating keyboard.

Very respectfully,

GEORGE A. CONVERSE,  
*Commander, U. S. N., President of Board.*

F. J. DRAKE,  
*Lieutenant, U. S. N., Member of Board.*

T. C. McLEAN,  
*Lieutenant, U. S. N., Member of Board.*

C. A. BRADBURY,  
*Lieutenant, U. S. N., Member of Board.*

The CHIEF OF BUREAU OF ORDNANCE,  
*Navy Department.*

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B.

NAVAL TORPEDO BOARD, BUREAU OF ORDNANCE,  
*July 12, 1892.*

SIR: In obedience to your orders we have the honor to state that we have made a series of tests with the Eriessson submarine gun and projectiles, and submit the following preliminary report of the results of those tests to date.

Nineteen shots have been made with the ordinary projectiles and one with the automatic depth-regulating projectile without rocket attachment. The data obtained from these twenty shots is shown by inclosed Table A.

The first four shots were made in the Erie Basin, Brooklyn, N. Y., where it was impracticable to use nets to determine the exact trajectory of the projectile under water. The four shots, however, demonstrated that it was possible to obtain a range of 600 feet with a projectile fired from a gun under water, with a moderate powder charge, and that the horizontal direction was excellent.

In order to determine the trajectory in the vertical plane, the authority of the Navy Department was obtained to use the Simpson dry dock at the New York navy-yard. Nets were procured and stretched across the dry dock at intervals of 100 feet up to and including 600 feet. The heads of the nets were so fitted that their middle points could be aligned along the center line of the dock and were marked each foot from the middle point. The bottom of the nets were weighted to make them hang properly.

A heavy mantelet net was placed across the dock 610 feet from the

muzzle of the gun, when fired, to prevent the projectiles from striking the altars at the head of the dock. The nets for marking the trajectories were 40 feet long and 20 feet deep, while the mantelet net was 50 feet long and 25 feet deep.

The *Destroyer*, in which the gun is mounted, and which, under the contract with the Ericsson Coast Defense Company, was to be furnished for the experiments, was moored by bow and quarter lines outside of the entrance to the dry dock and with the muzzle of the gun in the bow of the vessel, at a distance of 650 feet from the upper altar at the head of the dry dock.

The gun and its mechanism showed no weakness or defect during the trials and was satisfactory in its performance throughout. It is well and strongly secured in the vessel. During the trials its axis was 6½ feet below the surface.

The muzzle valve, which covers the muzzle of the gun and prevents the ingress of water, was disabled at the second shot by the breaking of the bolt that secures the plate of the valve to the hinge arm by which it is actuated. This bolt had become badly rusted and weakened during a continuous service under water of more than twelve years, and the accident was not due to any defect in design or workmanship.

The valve successfully performs the functions for which it was intended, viz: a water-tight shutter for the muzzle of the gun.

The powder used during the tests was the service sphero-hexagonal, Index 27, and the charges varied from 15 to 30 pounds, the former being used with the automatic depth regulating projectile. Not less than 20 pounds were used with any of the ordinary type of projectile, and it was found that a charge of 30 pounds produced a shock of discharge too violent for the tails of the projectiles to withstand.

The maximum pressure recorded in the chamber of the gun was 1½ tons.

The means for determining the time of flight of projectile were not sufficiently accurate to indicate any marked difference of velocity, whether the powder charge was 20 or 30 pounds and no practical difference in efficient range was shown by the differences in the weights of powder charge.

The projectiles furnished by the Ericsson Coast Defense Company under its contract and agreements were of three different types, viz:

Six ordinary; one automatic depth regulating, without rocket; one automatic depth regulating, with rocket.

The length of each was 27 feet, 4 inches.

The diameter of each was 15¾ inches.

The weight of the ordinary type loaded was about 1,500 pounds.

The weight of the automatic type loaded was about 1,700 pounds.

Each type is made dismountable in three sections, viz: head, middle, and tail.

The head section is of copper rings with composition nose and base. The other sections are of sheet steel, lap-welded to form. The explosive charge is carried in the head section, and space and buoyancy to carry about 300 pounds of explosives are provided. No tests were made of the mechanism for detonating the explosive charge.

There was a considerable difference in the form and alignment of the tiles, due to roughness of manufacture, and in the opinion of the jury much of the variation of the results of the trials of the projectiles of the ordinary type would have been eliminated had those projectiles been built upon correct forms, thus insuring fair lines with good alignment.

The construction of the tail is too weak to withstand the crushing strains caused by a charge exceeding 25 pounds of the kind of powder used for the tests. This defect can be overcome by increasing the thickness of the shell in the tail section and introducing more strengthening rings.

The board believes that the manner in which the tail of the projectile separates from the piston, after leaving the gun, has a considerable effect upon the trajectory. That a considerable force acts at that point of the projectile is evident from the fact that the tenon guide on the tail of the projectile and which is secured with two screws of considerable strength was found broken off.

But one shot with the automatic depth-regulating type of projectile was necessary to demonstrate that the shock of discharge with a charge of only 15 pounds of powder was too violent for the strength of the hydrostatic balance provided to maintain the projectile at an approximately uniform depth. The rubber sleeve and its inclosing grating were badly wrecked by the inertia of the water contained therein. The horizontal rudders, which were counterbalanced, had both their forward and after surfaces badly bent, and this injury was undoubtedly due to the force of water acting upon them during the flight of the projectile. Very considerable modifications in the strength and dimensions of the depth-regulating device must be made to accomplish any practical results therewith. Such modifications are quite feasible and can be made at a moderate cost. The wooden tail-fins were completely shattered and splintered when the projectile left the gun, demonstrating the necessity for using metal instead of wood. No trial was made with the automatic depth-regulating projectile with rocket attachment, as it was not deemed prudent to make the test in the dry dock, and a previous test of the hydrostatic arrangement similar in all respects had fully demonstrated its defects.

During the trials an effort was made to determine if changes in buoyancy of the projectile appreciably affected the trajectory, but the results failed to demonstrate. Changes in positive buoyancy, from 4 to 24 pounds, were made with the same projectile without affording any practical information upon this point of investigation.

It was found that a change in the trim of the projectile apparently had some influence with the trajectory in the vertical plane; by increasing the trim by the head from 4 inches to 22 inches, the range of the projectile before breaching the surface was extended about 100 feet. Further experiments are necessary to determine the amount of trim by the head required to produce the best results.

Slight variations in the trim of the destroyer, and consequently in the angle of the axis of the gun with the horizontal, had no appreciable effect upon the trajectory in the vertical plane.

The practical results of the trials to date may be stated as follows:

Had the target been a vessel of a length of 100 feet and a draft of 20 feet—

	Feet.
Fifteen of the twenty would have struck her at distance of .....	600
Do .....	500
Do .....	400
Seventeen of the twenty would have struck her at distance of .....	300
Twenty of the twenty would have struck her at distance of .....	200
Do .....	100

Eight breached the surface between 200 and 300 feet nets; four breached the surface between 300 and 400 feet nets; three passed the 600-foot net without breaching.

No trials have been made with the *Destroyer* underway.

The speed of the projectile, as nearly as could be determined, was as follows:

Mean for a distance of—	Knots.
600 feet.....	29.6
400 feet.....	52.6
300 feet.....	71.0
200 feet.....	94.7
100 feet.....	118.0

### CONCLUSIONS.

#### ORDINARY PROJECTILE.

First. The trials have demonstrated the practicability of obtaining a fairly accurate range of at least 600 feet with a projectile from a gun carried under water.

Second. The accuracy in the horizontal plane is good.

Third. The accuracy in the vertical plane is good for a distance of 200 feet. Beyond that point the projectile has a decided tendency to come to the surface and broaches between 250 and 400 feet from the muzzle.

Fourth. By giving the projectile a trim by the head of about 20 inches the broaching point is carried to a distance of about 400 feet from the muzzle.

Fifth. Variations in positive buoyancy between 4 and 24 pounds do not appear to practically affect the trajectory in the vertical plane.

Sixth. The tail of the projectile is not strong enough to withstand the shock of discharge when a powder charge of more than 25 pounds is used.

Seventh. Greater accuracy and possibly a greater range would result if the projectiles were more accurately constructed.

Further trials with the vessel under way are required to demonstrate the practical efficiency of the system for use as a weapon of warfare.

#### AUTOMATIC DEPTH REGULATING PROJECTILES.

First. The hydrostatic balance as now constructed is too weak to withstand the shock of discharge. The inertia of the water inclosed ruptures the inclosing sleeve and totally disables the depth regulating mechanism.

Second. All conclusions stated for the ordinary projectile, except that of accuracy in the vertical plane, apply equally to the automatic depth regulating projectile, and no conclusion can be formed from the trials regarding the exception.

Appended hereto is Table A. showing data obtained during the trials.

Very respectfully,

GEO. A. CONVERSE,  
*Commander, U. S. Navy, President.*  
 T. C. McLEAN,  
*Lieut., U. S. Navy, Member.*  
 C. A. BRADBURY,  
*Lieut., U. S. Navy, Member.*

Lieut. F. J. Drake, U. S. Navy, member, was not present during any the trials, he being absent on other duty.

GEO. A. CONVERSE,  
*Commander, U. S. Navy, President.*

CHIEF OF BUREAU OF ORDNANCE.



## Report of tests of Ericsson submarine gun.

TABLE A.

Date.	Serial No.	No. projectile.	Buoyancy.	Trim of torpedo.	Powder charge.		Air pressure in chamber before discharge.	Time (feet).							Depth of impact.						Horizontal deviation.						Remarks.
					Pounds.	Index.		Pressure in gun.	100 seconds.	200 seconds.	300 seconds.	400 seconds.	500 seconds.	600 seconds.	100 feet.	200 feet.	300 feet.	400 feet.	500 feet.	600 feet.	100 feet.	200 feet.	300 feet.	400 feet.	500 feet.	600 feet.	
1892. Mar. 4	1	6	+13		20	27 sp. lx.		4½					9½	Nets not used.						Nets not used.						Test made in Erie Basin without nets. Broached the surface at about 280 feet; direction very good. Tail fins bruised by centering rings. All rings missing from projectile.	
Mar. 4	2	1	+25		20	27 sp. lx.	1½	2½						Nets not used.						Nets not used.						Test made in Erie Basin without nets. Broached surface at 225 feet. Second breach at 250 feet. Direction very good. Tail fins bruised by centering rings. All rings missing from projectile. Muzzle valve of gun lost by breaking of its center bolt. Locked vessel to renew muzzle valve.	
Mar. 10	3	1	+22		20	27 sp. lx.		2½					12½	Nets not used.						Nets not used.						Test in Erie Basin without nets. Broached surface at 250 feet. Came to surface at 600 feet. Direction very good. All rings missing from projectile.	
Mar. 17	4	4	+35		20	27 sp. lx.		2½					1½	Nets not used.						Nets not used.						Test in Erie Basin without nets. Added 12 pounds to ballast in head to compensate for loss of rings. Leather packing on projectile leaked. Put on new packing. Slight horizontal deviation noticed. Broached at 250 feet. All rings missing. Shock of discharge on Destroyer very slight.	



## Report of tests of Ericsson submarine gun—Continued.

TABLE A—Continued.

Date.	Serial No.	No. projectile.	Buoyancy.	Trim of torpedo.	Powder charge.	Air pressure in chamber before discharge.	Time (feet).							Depth of impact.						Horizontal deviation.						Remarks.
							100 seconds.	200 seconds.	300 seconds.	400 seconds.	500 seconds.	600 seconds.	100 feet.	200 feet.	300 feet.	400 feet.	500 feet.	600 feet.	100 feet.	200 feet.	300 feet.	400 feet.	500 feet.	600 feet.		
1892. June 3	11	3	+5	34 inches by hd.	20 27 sp. bx.	25	Not taken.						7	7	6	5	.....	+2	+4	+6	+12					Test in Simpson dry dock, navy-yard, New York, with note. Horizontal deviation to 200 feet due to error of train of vessel which prolonged to end of run would make error due to projectile only 10 feet for distance of 600 feet. Tail of projectile strengthened by shrinking on band. A piece of lead weighing 31 pounds was found near head, it having become detached from inside ballast of tail.
June 4	12	4	+5	4 inches by hd.	20 27 sp. bx.	25	Not taken.						6	4	0	3	.....	+2	+3	+10					Test in Simpson dry dock, navy-yard, New York, with note. Leather packing of projectile leaked, put on new packing. Breeched at 250 feet and ran to head of dock just below surface. Tail of projectile strengthened by shrinking on band.	
June 6	13	2	+5	54 inches by hd.	20 27 sp. bx.	25	Not taken.						2	4	1	3	3 11	+2	+1	.....	0	+1	-1		Test in Simpson dry dock, navy-yard, New York, with note. Carefully straightened all fins, including the horizontal fins that were bent down for shot No. 6. Breeched at a and passed over 300-foot net. Tail of projectile strengthened by shrinking on band.	

Test	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	12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Report of tests of *Ericson submarine gun*—Continued.

TABLE A—Continued.

Date.	Serial No.	No. projectile.	Buoyancy.	Trim of torpedo.	Powder charge.		Air pressure in chamber before discharge.	Pressure in gun.	Time (feet).						Depth of impact.						Horizontal deviation.						Remarks.
					Pounds.	Index.			100 seconds.	200 seconds.	300 seconds.	400 seconds.	500 seconds.	600 seconds.	100 feet.	200 feet.	300 feet.	400 feet.	500 feet.	600 feet.	100 feet.	200 feet.	300 feet.	400 feet.	500 feet.	600 feet.	
1892.																											and its screws broken. Three indentations in tail section. Tail had been strengthened by having ring shrunk on. Interior mechanism found in good order.
June 16	20	2	+24.	22 inches by hd.	20	27 sp. hx.	25	...	Not taken.	8	7	5	0	6	...	0	-1	-4	-5	-7	0						Test in Simpson dry dock, navy yard, New York, with nets. Buoyancy and trim by head increased to improve results of shots Nos. 17 and 18. Broached at 400 feet. This was fourth test of this projectile, which is still in fair condition. Came to surface beyond 610-foot net.

## ORDNANCE OFFICE, UNITED STATES NAVY-YARD,

*Washington, D. C., Sept. 13, 1892.*

SIR: I have the honor to submit, for transmission to the Chief of the Bureau of Ordnance, the following report of the operations of this department since October 19, 1891, the date of my last report:

The officers on ordnance duty are as follows: Lieut. Commanders E. C. Pendleton and C. O. Allibone; Lieuts. F. H. Crosby, F. E. Greene, D. L. Wilson, C. J. Badger and A. Reynolds; Ensigns J. M. Poyer and A. L. Key; Lieut. John Conklin, U. S. Army; Gunners J. J. Walsh and F. C. Messenger.

The following officers have been detached: Lieut. Commander J. M. Miller, Lieuts. R. F. Nicholson and T. S. Rodgers, U. S. Navy; Lieut. J. C. Chamberlin, U. S. Army, and Gunner C. H. Venable.

The following officers have been attached to the yard under instructions: Commanders C. V. Gridley, W. W. Meade, E. S. Houston, and George E. Ide, and Lieut. Commander F. W. Crocker.

During the past year the various shops have been running at full time and to their maximum capacity.

The average number of employes has been 989; the greatest number being 1,023, in August, 1892; and the least number being 956, in November, 1891.

## GUNS.

The principal operations of the past year have been the manufacture of guns from 4 to 13 inches caliber, as follows:

*Thirteen-inch B. L. rifles.*—The first and only set of forgings was received from the Bethlehem Iron Company on May 24, 1892. This gun is now nearly assembled, and considerable progress has been made in its manufacture.

There are still 11 sets of forgings to be received, all from the above-mentioned company.

*Twelve-inch B. L. rifles.*—At the date of last report 1 was completed. There are now 4 completed, 1 well advanced, and the forgings for 1 more received and in hand. All the above are from the works of the Bethlehem Iron Company, the total number ordered being 8. Of the finished guns 2 have been shipped to San Francisco for the *Monterey*.

*Ten-inch B. L. rifles.*—At the date of last report there were 8 completed. There are now 21 completed, and considerable progress has been made on 4 more, making 25 in all, the total number ordered.

Of this number 22 are of forgings made by the Bethlehem Iron Company and 3 of imported forgings. Of the finished guns, 4 are mounted on board the *Miantonomoh*, and 2 have been shipped to San Francisco for the *Monterey*.

*Eight-inch B. L. rifles.*—At the date of last report there were 14 completed. There are now 21 completed, 6 of which are for the *New York*. The number of 8-inch guns ordered to date is 51, and deliveries of forgings have been made in whole or in part on all of them.

Two of the above are of 40 calibers, intended for Cruisers Nos. 12 and No. 13, and considerable progress has been made on them, as well as on 4 guns for Cruiser No. 6.

Of the total number 4 were built by contract. Guns up to and including No. 14 are afloat on vessels in commission. Eight are made of imported forgings; 26 of forgings received from the Bethlehem Iron Company, and 16 from the Midvale Steel Works.

*Six-inch B. L. rifles.*—At the date of last report there were 94 com-

pleted. There are now practically completed 134, viz, 6 of 40 calibers, 6 of 35 calibers and 122 of 30 calibers.

Of the above, 83 are of Midvale, and 51 of Bethlehem forgings.

Twenty-three of the total number were built by contract.

There are now 90 6-inch guns afloat on vessels in commission.

*Five-inch B. L. rifles.*—At the date of last report, 3 were completed; 2 being of the ordinary type of breechloaders and 1 a rapid-firing gun. There are now 8 completed; 6 completed except breech mechanism; 12 assembled and well advanced, and 3 in the preliminary stages, making 29 sets of forgings thus far received. Twenty-seven of the above are of Midvale and 2 of Bethlehem forgings.

The total number of 5-inch guns to be manufactured for vessels authorized is 56, including the 2 on the *Chicago*.

All of the 5-inch guns except Nos. 1 and 2 are of the rapid-firing type, with the Dashiell type of breech mechanism.

The remaining 27 guns are to be of Bethlehem forgings, and a number have already been received.

*Four-inch B. L. Rifles.*—At the date of last report 7 were completed, 1 being of the rapid-firing type, with Dashiell breech mechanism, 2 of the rapid-firing type, with Driggs-Schroeder breech mechanism, and 4 of the ordinary pattern. There are now 12 completed, 23 nearly completed, 20 under way, and 12 upon which no work has been done, making 67 in all ordered.

Of the finished guns of ordinary type, 2 have been issued to the *Dolphin* and 2 to the Naval Academy.

Of the 67 to be made in all, 25 will be of Midvale and 42 of Bethlehem forgings.

All of the 4-inch guns but 4 are of rapid-firing type, with the Dashiell type of breech mechanism.

#### GUN MOUNTINGS.

*Thirteen-inch turret mounts.*—The designs have been completed and the patterns for the steel castings are now in progress and will soon be completed. No actual work has as yet been done on any 13-inch mounts, but the material for 4 sets has been ordered.

*Twelve-inch turret mounts.*—Two mounts of Mark I type have been completed and shipped to San Francisco for the *Monterey*.

Four mounts of the same type for the 12-inch guns of the *Puritan* are now under way, and 2 mounts of Mark II pattern for the *Texas* have been ordered and requisitions made for materials. The retention of the *Monterey's* 12-inch mounts after completion and their use at the proving ground proved to be of great value, as some marked improvements were introduced in the valves, rammers, and elevators, owing to experience gained there. Each mount as completed has been erected and put under pressure with a gun mounted in it, in the shops, and has then been put in actual service at the proving grounds.

*Ten-inch turret mounts.*—Two for the *Monterey*, distinguished as Mark II (those on the *Miantonomoh* being Mark I), have been completed and shipped to San Francisco for that vessel. The two known as Mark III (having the recoil check independent of the hydraulic system) have been completed and tested for the *Maine*, and 2 of the same type are under way for that vessel. Four sets have been ordered for the *Amphitrite* and 4 for the *Monadnock*, of Mark II pattern, and work is in progress on the first 2 for the former vessel, making 18 10-inch mounts in all to supply all the vessels having 10-inch guns, except the *Terror*, which is to be supplied with pneumatic carriages put in her by contract.

**Eight-inch turret mounts.**—Four are now in process of manufacture for the *New York*, 2 being nearly completed. Four more are to be built for Cruiser No. 6. There are still to be built 24 8-inch turret mounts for the battle ships.

**Eight-inch C. P. mounts.**—Two have been completed for the forecastle guns of Cruisers Nos. 12 and 13. Those for the waist guns of the *New York* are also completed, thus finishing all mounts of this type that have been ordered.

**Six-inch C. P. mounts.**—At date of last report 100 had been completed. There are now 105 completed.

The total number required to equip all the vessels authorized is 127. Several sets of castings have been received and are now under way.

**Five-inch rapid-fire mounts.**—At date of last report 1 was completed. Ten are now practically completed and 10 more well advanced.

The total number required for vessels authorized is 54. Thirty sets of castings have thus far been ordered and 25 of them have been received.

**Four-inch rapid-fire mounts.**—At date of last report there were 2 completed. There are now 15 practically completed, and 5 more well advanced. Forty sets of castings have been ordered and 30 of them delivered. Sixty-nine sets in all are required for vessels authorized.

Work has been carried on on hydraulic mounts for 6, 3, and 1 pounder guns, on practice barrels, drill cartridges, firing locks, electric, friction, and percussion primers, gun implements, and powder tanks; also on boxes for the storage of 4-inch and 5-inch rapid-firing ammunition. Targets have been built and armor plates prepared for the proving ground, and much work on the outfits of vessels now being built has been performed.

The quantity of gun steel received from the Bethlehem Iron Company has been 1,854,493 pounds, and from the Midvale Steel Works 215,046 pounds, making a total of 2,089,539 pounds (up to September 7, inclusive). Of the above 4,250 pounds only were rejected.

#### NEW MACHINERY.

The principal feature has been the installation of eight heavy gun lathes in the north gun shop, of the following dimensions: One boring and turning lathe having a capacity for boring guns 51 feet in length and of turning guns of 57 feet; hence will bore and turn guns of and under 16 inches caliber.

Two boring and turning lathes having a capacity for boring guns 45 feet in length and of turning guns 50 feet in length; hence can turn guns of 16 inches caliber and less and bore guns of 13 inches caliber and less.

Two boring and turning lathes having a capacity for boring guns of 32 feet in length and of turning guns 37 feet in length; hence will turn guns of 12 inches caliber and less and bore guns of 10 inches caliber and less.

Three turning lathes having a capacity for turning guns 51 feet in length; hence will take guns of and below 16 inches caliber.

These machines are all unique in design and of great power, and are conveniently arranged for performing the various functions for which intended.

It is doubtful if a finer group of machines of the kind can be found to-day in any part of the world.

During the past year the rifling machine for heavy guns, with its



slotting attachment, has been completed and been in successful operation for several months past.

The hot-air furnaces in the shrinkage pit have been completed and have been in satisfactory operation for nearly a year. No difficulty is experienced in heating uniformly the largest-sized forgings, and they may be regarded as an unqualified success. The use of oil fuel in these furnaces has been found entirely satisfactory.

During the past winter a sufficient number of incandescent lamps were installed in the gun shop, gun-carriage, projectile, and mount shops to light them fully, there being 524 in all, and two 110-volt (400, 16 candle power light) Thomson-Houston dynamos were added to the electric plant.

A sum of money having been appropriated for the improvement of the breech-mechanism shop and for the purchase of additional new tools for the same, the work of alteration has been begun by the department of yards and docks, and a skylight 225 feet long by 15 feet wide is to be built. The floor of the second story is to be removed and the old offices and partition walls at the ends torn out. The railroad track is to be brought into the west end; new doors and windows put in, and an asphalt floor laid; foundations put in for crane supports; new vise and work benches put in and the interior painted and suitable inclosures erected for office and storerooms. With a 10-ton electric crane and new machinery this shop will be a valuable extension to the plant.

#### IMPROVEMENTS.

The very crowded condition of the gun-carriage and projectile shops renders it desirable that the part of the building in which they are situated, which is now occupied by forge shop, should be vacated, and that space be thrown into the machine shops. The forge shop is in itself a menace to the rest of this large building, which is filled with costly machinery and material.

There is a detached building immediately south of it, now known as the mold loft, which would make an admirable forge shop. In the annual estimates the above changes were recommended and estimated for.

A new timber shed of corrugated iron, for the storage of patterns and materials for making the same, is urgently required. One end of the building is to be used as a metal store, and plans for such a structure have been prepared and submitted, with an estimate, to the Bureau of Yards and Docks.

The need of floor space is becoming a matter of serious importance, as the installation of new machinery has crowded the finished materials out of the shops, and there is at present no suitable place for their storage. Guns are piled up three tiers high at the south end of the gun shop, and there is scarcely room to carry on the work of fitting breech mechanism, sighting, etc.

As the 13-inch guns begin to be completed it will be a problem to know what to do with them, as they can only be handled by the largest of the cranes, which confines them to the north gun shop. Possibly four might be accommodated on the floor, but no more, and, as there are twelve now ordered, it will be a question, before a year is over, how to dispose of them. A heavy wrecking car, with a 15-ton derrick, would be of great service in the yard in handling materials, much of which, such as steel castings for carriages and mounts and gun hoops, could then be landed along the railroad tracks, of which there are 2 miles in the yard, and picked up as required. The department of yards and

docks has estimated for such a car. The same department is gradually improving Store No. 11, an unfinished foundry, and, in the course of time, it will be of great service as a storehouse.

The increase in the number of machines and the installation of additional engines has made the demands upon the main boilers in the Quadrangle so great that during the winter months all of them have to be kept constantly under steam, rendering it impossible to clean them properly or effect repairs. In order to overcome this difficulty in a measure the boilers of the copper-rolling mill, which are only used occasionally, will, by the Bureau's direction, be connected with the steam mains of the gun shop, and will suffice to run its engines and allow of a portion of the main boilers being laid up when necessary.

The following is the estimated capacity of the gun shop per annum:

16-inch.....	2	Or 16-inch.....	2
13-inch.....	2	13-inch.....	4
12-inch.....	2	10-inch.....	12
10-inch.....	12	6-inch.....	35
8-inch.....	25		
Or 13-inch.....	10	Or 13-inch.....	10
10-inch.....	12	10-inch.....	12
8-inch.....	25	6-inch.....	35
Or 13-inch.....	4	Or 12-inch.....	12
12-inch.....	4	10-inch.....	12
10-inch.....	12	6-inch.....	35
8-inch.....	25		
Or 13-inch.....	4	Or 10-inch.....	24
12-inch.....	4	8-inch.....	25
10-inch.....	12	Or 10-inch.....	24
6-inch.....	35	6-inch.....	45
Or 12-inch.....	12		
10-inch.....	12		
8-inch.....	25		

Different arrangement of calibers will, of course, give other figures.

The foundry has been busily engaged in the manufacture of cast-iron projectiles and upon the detail work of gun mounts and equipments.

The following number of projectiles has been cast:

Caliber	Num-ber.	Weight.	Caliber.	Num-ber.	Weight.
		<i>Pounds.</i>			<i>Pounds.</i>
13-inch.....	32	39,500	6-inch shrapnel.....	19	1,520
12-inch.....	302	294,550	60-pound shell.....	122	610
10-inch.....	268	160,800			
8-inch.....	1,602	512,640		11,835	2,001,360
6-inch.....	5,791	752,830	Weight of iron castings other than projectiles.....		475,606
5-inch.....	1,411	98,770			
4-inch.....	2,190	109,500	Total cast iron.....		2,477,026
10-inch shot.....	3	1,650	Bronze castings.....		456,111
8-inch shot.....	35	14,000			
6-inch shrapnel.....	60	15,600			

#### POWDER TANKS.

The following number of cylindrical copper powder tanks have been

8:

nch charges.....	1,859
nch charges.....	800
1-inch charges.....	220
13-inch charges.....	1

The average number of seamen under instruction has been 26.4, the greatest number being 32 and the least number present at any time 18. Thirty-seven have qualified as seamen gunners.

The work, as heretofore, has been carried on under the direct supervision of the officers who not only are made responsible for its accuracy, when completed, but are charged with its superintendence throughout, a system which is found to be productive of excellent results; and it is due to them all to say that they have been indefatigable in their labor.

Very respectfully,

CHARLES O'NEIL,

Commander, U. S. Navy, Inspector of Ordnance.

The COMMANDANT UNITED STATES NAVY-YARD,

Washington, D. C.

*Steel B. L. rifles manufactured for the Navy and in process September 15, 1892.*

Condition, etc.	13-inch (35 cal.).	12-inch (35 cal.).	10-inch (34 cal.).	10-inch (30 cal.).	8-inch (40 cal.).	8-inch (35 cal.).	8-inch (30 cal.).	6-inch (40 cal.).	6-inch (35 cal.).
Completed at date of last report .....		1	2	6		9	5	1	2
Completed September 15, 1892 .....			2	19		16	5	2	4
Nearly completed .....		1		2		2		4	2
Assembled and partly completed .....	1			2	2	24			
Forgings received and in hand .....		1							
Total made and making at Washington navy-yard .....	1	6	2	23	2	44	5	6	6
Built by contract .....							4		
Total .....	1	6	2	23	2	44	9	6	6

Condition, etc.	6-inch (30 cal.).	6-inch (wire wound).	5-inch (30 cal.).	5-inch R. F. (40 cal.).	4-inch (40 cal.).	4-inch P. S. (40 cal.).	4-inch R. F. (40 cal.).	6 pounder field.	
Completed at date of last report .....	91	1	2	1	4	2	1	5	133
Completed September 15, 1892 .....	120	1	2	6	4	2	6	5	198
Nearly completed .....	2			6			23		42
Assembled and partly completed .....				12			20		37
Forgings received and in hand .....				3			12		42
Total made and making at Washington navy-yard .....	122	1	2	27	4	2	61	5	319
Built by contract .....	23								
Total .....	145	1	2	27	4	2	61	5	340

In addition to the above, one 8-inch gun of 35 calibers and one 6-inch have been manufactured for the Bethlehem Iron Company, and one 6-inch for Messrs. Du Pont & Co.

THE OFFICE OF THE DIRECTOR, FBI, HAS BEEN ADVISED BY THE NEW YORK OFFICE THAT

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Also one paid the one dollar charge for the Southern Bell Company and one paid charge for the phone. The Bell Co.

NAVAL PROVING GROUND,  
Indian Head, Md., October 3, 1892.

**SIE:** I have the honor to submit the following report on the operations at this station during the past year:

*Progress of the station.*—The hills on both sides of the valley have been cut away to make room for gun platforms and the boiler house and to clear the line of fire down the range. The excavation for the second firing butt has necessarily been a very large one, but most of it was done by firing the 10-inch and 12-inch guns into the hill and great expense has been thus saved. The earth from these cuttings has been utilized in filling up low places in the valley, the level of which has been raised to that of the railroad for the traveling crane. It is now possible to build the temporary sidings directly on the ground instead of on high blocking, and the side-tracking of heavy weights has been greatly facilitated by this raising of the ground. The cutting away of the bluff which obstructed the range is now nearly completed and all guns on the range battery have a clear sweep of fire over the entire width of the river. Velocities are now taken in firings from this battery, a most desirable feature in ranging and hitherto unattainable, owing to the presence of this high bluff.

The stream through the valley is confined very well by the piles driven last year. This piling is being continued further up the valley to prevent the banks being cut out too much. Immediately in front of the range and armor batteries the stream has been covered over with pine and oak logs, upon which earth has been dumped, thus making one continuous surface over the whole firing ground west of the railroad. This was found to be necessary to prevent the heavy blast from the battery tearing up the stream retaining walls. All the range battery being on made land it was found that the rails and their bed set tled a few inches during the year, making it necessary to build up a crib-work from the original marsh level to support the trucks for the 13-inch gun mount. In order to spread the support for these great weights a strip of 50 feet wide and 100 long has been reclaimed from the river shore by piling, so that the range battery may be considered as completed. It has been faced off by a concrete retaining wall upon which the blast plates can be laid as needed, and which has withstood most satisfactorily all discharges over it.

The large bomb proof at the west end of this battery has been repaired, somewhat altered in design, and protected by a new front of timber and earth. The bank immediately in rear of the battery has been prevented from slipping by a wall of piling.

Considerable work has been done in the construction of drains to confine the rain water as it comes down from the hillsides and throw it into the main stream instead of over the firing ground.

The annoyance of mud, so great in last winter's work, will be found much less this year.

Roads and fences have been constructed in the most substantial manner possible. The amount of hauling of stores, ammunition, etc., is very great, and the roads have to be the best that can be made. The Bureau has approved the construction of a railway from the wharf to the storehouse, with switch lines to the filling house and magazine. The construction of this line has been begun. When completed this tramway will save its total cost in one year, besides increasing the dispatch of the business of transporting stores and ammunition from the wharf and enabling charges to be brought quickly and safely from the filling house to the battery.

The explosion chamber has been completed and is in satisfactory operation.

An excavation has been made in the hill on the south side of the valley, about 400 yards from the river, for the boiler house. In it has been laid a heavy structure of live-oak logs, to which the large hydraulic pump is bolted. The entire flat has been paved with brick laid in cement, and the boiler, lathe, and planer have been installed.

The water for the hydraulic system is drawn from the river and can be delivered at both range and velocity batteries. This system is now in good working order, but it needs an accumulator to make it complete.

The great increase in the amount of work at the station during the past year has necessitated additions to and interior changes in both the storehouse and filling house. With the transfer to this station of all material used here and the opening of our own store-keeping books an additional room was required at the office, which room has been finished and is in use. Another such addition will soon be necessary in which to keep the range table and other range instruments.

Cottage No. 3 has been completed and occupied since December, 1891.

Cottage No. 4, a double house, for bachelor officers and boards in one side and a family in the other, was begun January 1, 1892, and has been finished and is now occupied.

A small boathouse has been erected in an angle of the wharf to shelter the whale boat and dinghy, and to receive small articles which may be landed in rainy weather.

The farm known as the Irwin estate has been purchased. The land, being of good quality, is utilized in raising the feed necessary for the five horses belonging to the station. The acquisition of this strip of land puts an end to all complaints that could be made of pieces of projectile falling on property owned by private individuals. Its extension is such that even if a shot got away from the butt it would fall on Government ground. The buildings, barn, and excellent timber on the property have already proved their value.

The system of sand butts has proved thoroughly satisfactory. No shot can get out from them, and all projectiles can be easily recovered.

The new butt is now ready for its plating.

The chronographs, batteries, and circuits are in very satisfactory

condition and have required no changes or alterations since their first installation.

The drainage and water supply of the station are excellent. Tanks in the attics, filled from wells, supply all the quarters with water in bath rooms and kitchens, and drains are arranged to be flushed with every rainfall. There has been no sickness of any kind at the station thus far.

*Proof of guns.*—The following guns have been given the full proof for service:

Four-inch B. L. R. Nos. 2, 3, and 6; 4-inch R. F. G. Nos. 7, 8, 11, and 4; 5-inch R. F. G. Nos. 5 and 6; 6-inch B. L. R., of 30 calibers, Nos. 99, 100, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 122, and 123; 6-inch B. L. R., of 40 calibers, No. 120; 6-inch quick-firing, of 40 calibers, No. 127; 8-inch B. L. R. Nos. 15, 17, 18, 19, 20, and 21; 10-inch B. L. R. Nos. 5, 6, 7, 8, and 16; 12-inch B. L. R. Nos. 1 and 2; 6-pounder R. F. field guns, five in number.

All of the above-named guns except one of each caliber retained at this station, have been either issued to service or are at the Washington Navy-Yard awaiting the completion of the vessels for which they are intended.

There has been no failure in the smallest particular of any gun in proof.

The recently adopted breech mechanism for rapid-fire guns of 4, 5, and 6-inch calibers has been put to a most thorough test, with both good and defective ammunition. Four-inch gun No. 11 was fired 248 times. The mechanism was worked about 8,000 times with tight-fitting cartridge cases. These cases had to be hammered into the gun and were selected for the purpose of testing the extractor. There has been no failure in the action of any part. A test for rapidity of fire was made before the Chief of Bureau and Bureau officers. Five rounds were fired in seventeen seconds, using experimental cases. Since then, on two occasions, 5 rounds have been fired in fourteen seconds. On the second trial the gun was laid at 10° elevation and all five projectiles were in the air together.

Similar exhaustive trials have been held with the 5-inch rapid-fire mechanism. Five rounds have been fired, in two instances, in twenty-four seconds and twenty-two seconds, respectively, without preliminary drill. The charge and projectile made up in one weigh 95 pounds (with brown powder) and can be easily handled by one man.

There have been no cartridge cases as yet for the 6-inch quick-firing gun, the De Bange check being used for obturation. The 6-inch rapid-fire mechanism was tested in competition with the service mechanism by a board of which Capt. J. A. Howell, U. S. Navy, was the senior member.

The conditions of firing were precisely similar with each gun—the elevation 3°; service carriages; gun sponged after each round.

The gun, with the ordinary service mechanism (Mark III), was fired 10 rounds in five minutes and two seconds, while that fitted with the quick-acting mechanism was fired by the same crew ten rounds in two minutes and fifty-six seconds.

A 4-inch rapid-fire gun, with the Driggs-Schroeder fermature, has been fired 23 rounds, a detailed report of which was submitted at the time.

The 10 and 12 inch breech mechanism have been found to work well, with the exception of the spring latch, old type. One latch of the new model has been tried and works as well as could be desired. When this

The authors thank M. H. H. van den Hul, J. van den Hul, and J. van den Hul for their contribution to the development of the model. The authors also thank M. H. H. van den Hul, J. van den Hul, and J. van den Hul for their contribution to the development of the model.

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Hydrocarbon content: Mark 4H, with independent second cylinder, is still the best choice for analysis, as the most satisfactory type yet evolved.

A field test was run for 30 minutes and the 'gum' has been tested by pulling it out of the ground, pulling it out of frozen ground and in deep mud. It came out of the mud and out of the conditions. Its tracks look like the wheels of a tank. It is made to last.

The mean rate of respiration was 0.10 shots per minute with rough patterns, and 0.06 with smooth patterns.

**Proof of power.** Psychoanalysis, as an education, has been tested, with an interesting result. Not only do higher abilities have been attempted, but in the Psychoanalysis, except for the French girl, the most talented and intelligent young women have appeared. In the French girl and the girl who was the first to win the gold medal in the 1000 yard race, the excellent record of 1:34.00 minutes, obtained by the American athlete.

Tests of  $p$ -value for  $T$  for sets of 4 such electrically yielded common ball joints were made. Properties of many have been tested. These ball joints give a very broad range of values at 1000

A sample of the geonitid *Levinseniella* from the United States (Florida) *Levinseniella* have also been tested.

For the purpose of this study, all plots of Sarah A. P. Carpenter shall have been accepted, that is, as the required acceptance test.

One of the bars, A. P. 101, from the Sterling Steel Works of Pitts-  
burgh, Pa., was subjected and passed the reception test most satisfac-  
torily.

The shell function `Y_P_C` (printer shell) has been tested and passed successfully.

These are the only acceptance tests of projectiles made at this station during the past year, but in firing at armor plates, in which trials the plates compare to the projectile opportunities have occurred to more clearly show the performance of armor piercing shell than in the actual projectile test. Holtzer, Knuth, and Carpenter shell, in considerable numbers of 6, 8, and 10 inch calibers, have been fired against both hard and soft plates with wide range of velocities. The performance of the present 6 inch Holtzer has not been surpassed by the other makers, but all the Holtzer 8 inch shell have bulged much more than





rejected. Another plate of the same size, of nickel steel, from the same manufacturers, and representing armor for the same ship, successfully withstood without a single crack the three rounds from the 8-inch gun required by the test for acceptance.

A steel plate by the Bethlehem Iron Company, representing armor for the turrets of the *Terror*, has passed the acceptance test, although badly cracked by the third shot.

The 14-inch nickel steel plate, from the Bethlehem Iron Company, representing the diagonal armor of the *Indiana*, was tested with the 10-inch gun and received the three shots without cracking.

The *Monterey's* side armor, from Carnegie, Phipps & Co., has been proved and passed successfully, the 6-inch plates having been fired at with the 6 and 8 inch guns and the 13-inch plates with the 10-inch gun.

The *New York's* side-armor test plate, 4 inches in thickness, from the same firm, was proved with 4-inch A. P. shell.

*Smokeless powder.*—Smokeless powder, made at the torpedo station, Newport, has been fired in all calibers up to and including the 6-inch.

The first samples for the light guns, 1, 3, and 6 pounders, were of small cubical granulation. High velocities with low pressures were obtained, but there was too great irregularity in results.

The following were among the best (cubical grain):

Gun.	Charge.	Muzzle velocity.	Pressure.
	<i>Grams.</i>	<i>Ft. sec.</i>	<i>Tons.</i>
1-pounder .....	80	2, 150	15
3-pounder .....	340	2, 225	14. 1
6-pounder .....	418	2, 047	15

The "macaroni" form was designed for the 4, 5, and 6 inch, but as an experimental trial with it in the light guns was so promising it has now been adopted for all calibers.

The following results have been obtained; they are not isolated, selected figures, but results that have and can be duplicated:

Gun.	Charge.	Projec- tile.	Muzzle velocity.	Pressure.
	<i>Grams.</i>	<i>Pounds.</i>	<i>Ft. sec.</i>	<i>Tons.</i>
1-pounder .....	80	1	1, 400	6. 9
3-pounder .....	425	3. 3	2, 313	12. 6
6-pounder .....	440	6	1, 910	10. 5
	<i>Pounds.</i>			
4-inch rapid fire .....	5. 3	33	2, 160	15
5-inch rapid fire .....	11. 25	50	2, 540	15. 2
6 inch (40 caliber) .....	26	150	2, 469	13. 06

The rapidity of combustion in the gun can be regulated by an increase or decrease of the diameter of the stick. There is only the thinnest kind of vapor in the blast, which quickly dissipates. The target can be clearly seen through the blast, and a practiced eye can follow the projectile from the 6-inch or 5-inch gun from the muzzle to the point of impact. If the breech is opened immediately after the discharge the bore and chamber are found full of dark purple or dark-brown fumes or smoke. This smoke can be inhaled without discomfort or the choking sensation felt when ordinary powder smoke is inhaled. It rapidly passes off, leaving the gun clear. A greasy film is left in the bore and chamber. No sponging or wiping out is required after firing—

even the gas checks are quite clean and need no wiping. The recoil of the gun is not greater than with service charges. Besides smokelessness and high velocities, the last-named quality, *i. e.*, no dirt or fouling in the gun, places at once the 6-inch gun with quick-acting mechanism among rapid-firing guns, even if using the service cartridge bag and DeBange check and priming for each shot. As an example, before the Howell board 10 rounds were fired in two minutes and fifty-six seconds, sponging the chamber and wiping out gas-check slope and gas checks after each round. The time for sponging was five seconds, for wiping out slope two seconds, or a loss of seven seconds due to the use of a powder with a residue. There being nine intervals in the ten rounds, one minute and three seconds would have been saved had smokeless powder been used, or the 10 shots could have been fired in one minute and fifty-three seconds, which is as good if not better than the record of any foreign 6-inch gun with projectile of 100 pounds weight.

Of course there has been insufficient time to test the keeping qualities of this powder. A charge of 6-inch powder has been kept sealed up for six months in a service tank at normal atmospheric temperatures. When opened no change in its condition could be detected. When fired the results were very satisfactory.

Gun.	Charge (M N 3)	Projec- tile.	Muzzle velocity.	Pressure.	
	Pounds.	Pounds.	Ft. sec.	Tons.	
6 inch, 40 caliber.....	20	100	2,207	13.2	New.
Do.....	20	100	2,170	12.0	After six months' storage.

*Wire nets and mantlets.*—The test of the two wire-net shields with the small-caliber rapid-fire guns and with 6-inch shell exploded near them has proved the inferiority of wire nets to steel plates either for mantlets or gun screens, the weight of wire net and steel plate being the same.

*Fuses.*—A satisfactory base percussion fuse has been tested. Loaded 6 and 10 inch shell have been fired down the range, fitted with base and nose percussion fuses, respectively. These shell burst on impact with the water.

A combination adjustable time and percussion fuse has been tried in 4-inch shrapnel and gives promise of an ultimate satisfactory development.

*Emmensite.*—As soon as the completion of the explosion chamber permitted bursting experiments to be made, the development of a satisfactory fuse for the detonation of emmensite was begun. Very good explosive results have been obtained at Annapolis with emmensite as the bursting charge of shell, the explosive being ignited by means of signal stars. In violence such an explosion is probably about three or four times as violent as if the shell had been charged with gunpowder. A fuse has been designed at this station which will detonate the emmensite in a shell and yet is safe to fire. Five of these fuses were prepared as projectiles and fired safely from the 3-pounder gun, which gives the most violent initial shock of any caliber to its projectile. The gun designed by the Bureau for these experiments was a cast-iron smooth-bore 11-inch gun of the old pattern. It was rifled and chambered and fitted with a slotted-screw breech mechanism. The gun was mounted upon an ordinary service Ericsson carriage. Two shells filled with 42 pounds of emmensite, not fused, were successfully fired down the range

with a charge of 40 pounds, the pressure being from 3.3 to 5.5 tons. A shell was then filled with 42 pounds of the explosive, and a fuse composed of signal stars, such as had been found efficient at Annapolis for bursting the shell, was fired. The estimated pressure was from 5½ to 6 tons. Upon firing the gun burst, its fragments flying in all directions. The rupture took place all along the breech and cylinder of the gun, the muzzle remaining entire for 18 inches of its length. This was projected 80 feet to the front. The breech-block struck the bank in rear but little bruised. The side walls of the gun broke up into very large pieces. The carriage was demolished. The shell broke up when the gun burst, the fragments being of large size. It seemed by the marks on the band to have moved forward about 2 inches. When the gun was ruptured the emmensite was scattered in all directions, some of it probably being ignited and burned. The fragments of the bore of the gun were covered with a thick layer of emmensite, which formed a kind of varnish of a sirupy consistency, mixed with the products of powder combustion. I had taken a position three-quarters of a mile down the range to photograph the impact of the shell on the water when the explosion occurred. The entire primer, with its stars blazing, went through the trees over my head, burning the leaves and twigs. It struck the ground and bounded overboard. Nothing was injured on the grounds and no one was hurt. I made most careful investigations into the cause of the explosion, and beg to submit the following opinion: Bureau's order of May 10, 1892, No. 3336, limited the pressure in the gun to 8 tons. The preliminary rounds with less than 5.5 tons were so severe upon the carriage as to cause me to stop the increase of charge and to be satisfied with a shorter range and less velocity than was originally desired, in order not to break down the carriage and stop the experiment altogether. The pressure of 8 tons seemed too high for such an old gun, but being pressed for time and relying on the orders of the Bureau, I made no calculations until after the explosion, when I found that the gun was in fact dangerously strained with a pressure of from 5 to 6 tons, even with metal of standard tensile strength. The fracture of the metal showed clearly that its physical characteristics were undoubtedly much below the standard. It is surprising that the gun did not burst on the second round.

The gun broke at the breech first, going into very large fragments, and the muzzle was not affected. The shell also broke into large pieces, and the fuse and primer were entire some seconds after the explosion.

Emmensite was found on the gun platform, on the carriage wreck, on the entire surface of the bore, as shown on fragments of the gun that were recovered, and on the walls of the shell itself, many fragments of which were recovered.

From the above I am convinced that the pressure of the powder gas was too great for the gun walls to withstand, and that the excessive charge caused the accident. The shell broke up and did not explode. Had this shell exploded the gun and projectile would have gone into very small pieces and the wreckage around the battery would have been terrible.

I have witnessed two explosions of heavy guns, one in which the shell filled with high explosive burst in the gun, the other in which the powder charge ruptured the gun. The explosion of the 11-inch mortar bore a very close resemblance to that of the second instance cited (the 6-inch cast-steel gun) and no resemblance whatever to the first-named explosion (explosive A).

Although this accident put an end temporarily to a most important series of experiments, enough has been demonstrated to convince me of the successful firing in the near future of emmensite for a high-power powder gun. A fuse of the simplest construction has been devised, safe to fire and sure to detonate the emmensite on impact with the water or a vessel's side. I would respectfully recommend to the Bureau that these experiments be continued, using a gun made for the purpose, with carriage, projectiles, etc., constructed with special care for the end desired. Most satisfactory results must follow.

Ensigns Dieffenbach and Rust have been stationed here during the year. They have discharged with commendable zeal and ability the many varied and responsible duties assigned them. I wish also to call to the Bureau's notice the very efficient and satisfactory manner in which Acting Gunners Gilmartin and Tresselt performed their duties while at this station.

Very respectfully, your obedient servant,

R. B. DASHIELL,

*Ensign, U. S. Navy. Inspector of Ordnance, in Charge.*

The CHIEF OF BUREAU OF ORDNANCE,

*Navy Department.*

NAVAL TORPEDO STATION,  
*Newport, R. I., September 15, 1892.*

SIR: I have the honor to submit the following report of the work of this station for the past year:

The list of officers attached to the station and the distribution of duties is the same as that of last year, with the following exceptions:

Lieut. Commander Charles Belknap reported for duty on September 28, 1891, relieving Lieut. Commander W. I. Moore, who was detached October 1.

Lieut. R. C. Smith reported on July 15, 1892, and was assigned to duty in connection with the trials and tests of smokeless powder and as assistant to Lieut. McLean.

Passed Assistant Paymaster C. S. Williams relieved Passed Assistant Paymaster T. J. Cowie as pay officer and general storekeeper on October 12, 1891.

BUILDINGS AND PLANT.

In addition to the customary repair of the buildings at the station the floors at the south end of the gun-cotton factory have been renewed. This is the portion of the building in which the nitrating of the cotton takes place and where the deterioration is greatest. Advantage was taken of these repairs to improve the ventilation of the building, so that the fumes from the dipping troughs are now more completely removed. All of the interior woodwork of this part was coated with asphalt varnish as a protection against the action of the acid fumes.

The lead of the fresh-water supply to this building has been renewed and so changed that the pipes are no longer exposed to the corrosive action of earth saturated with acid.

A new floor has also been necessary in the general storehouse.

While it was being laid a cellar 28 by 42 feet was dug to give additional storage room that was very much needed.

Additional racks for the storage of gun cotton have been erected in the magazine at Rose Island. As a precaution against fire the doors and shutters of this building have been cased with iron. It will soon become necessary to increase the capacity of this magazine by fitting another section of it for the reception of gun cotton.

A shed has been erected in the ditch on the west side of the island for a mixing and drying house in connection with the manufacture of smokeless powder. This removes a possible source of accidental fire to a point where it would do the least damage.

The fire system has been extended, a new fire plug being erected near the gun-cotton factory and another near the torpedo-boat house and 700 feet of 6-inch pipe laid. In the torpedo-boat house a powerful hand pump has been permanently set up, with a hose reel conveniently near.

The water main connecting the station with the Newport water works has given considerable trouble by leaking, so much so at times that it has been necessary to shut down portions of the works. A supply of pipe has been obtained and a new main will be laid immediately.

The main boilers have been re-set and the furnaces, fronts, and overhead connections repaired.

The plant for the manufacture of smokeless powder has been increased by the addition of an incorporating mill, two improved purifiers, two indurators, a sifter and mixer, one screw press, and two hydraulic presses.

To accommodate this additional apparatus the building formerly used as a steel laboratory was fitted up. A new engine, to take the place of the old oscillating engine, which is worn out and deficient in power, has been ordered, but is not yet installed. The transfer of this building to the smokeless powder works has somewhat crowded the chemical laboratory, which will be remedied by a subdivision of the room formerly used as a lecture room.

The main-shop engine will require overhauling within a short time, the work to be done by our own force.

#### MARINE RAILWAYS.

The marine railways are in good condition. The central one was thoroughly tested during the year by taking out the *Cushing*. The work of taking out so heavy a boat is slow, on account of the hand power used, but she was perfectly supported on the ways and was not subjected to undue strain.

The design of the house over the ways was defective in not allowing sufficient head room over the boats. Should a convenient opportunity occur I shall recommend raising the roof of the building 5 or 6 feet.

#### TORPEDO BOATS.

The *Cushing* was taken on the ways in October of last year and was put out of commission on November 11. She was launched again early in January, when she was recommissioned. During this interval her engines were thoroughly overhauled and new packing rings were fitted to the engine pistons and to the piston valves. Necessary repairs have been made to one of her boilers during the present month.

The *Stiletto* has been fitted with two launching tubes for the Howell torpedo. One of these is a center-pivot deck mount placed aft, the other a fixed tube placed in the bows of the vessel. This latter work,

requiring as it did a metallic stem piece and practically a rebuilding of the bows of the vessel, was somewhat novel in the experience of the station, but it was well and economically performed.

The additional weights have slightly increased the draft of the vessel, but, together with the rearrangement of her ballast, they have noticeably increased her stability.

While the bow tube was being placed the engines of the *Stiletto* were overhauled. A new guide for the piston of the low-pressure engine was fitted to replace the old one, which was broken. The engine is in excellent order and the boat has been in constant use during the summer in experiments with the Howell torpedo.

The exhaust from the motors of the launching tubes, which was formerly delivered into the smokestack, has, by direction of the Bureau, been carried into the condenser. The leading of this oil-laden and highly-heated steam into the condenser is a cause of some apprehension as to the durability of the condenser.

The Almy boiler, placed in this boat in the previous year, has continued to meet the demands upon it and to give general satisfaction.

The good condition of the *Stiletto*, and especially the condition of her machinery, after five or six years of almost unremitting hard service, is highly creditable to her builders, as well as to the machinist, George Ufford, who has had the care and management of the engines for the past three years.

In addition to her value for experiment and trial purposes, the *Stiletto* is now really a torpedo boat, capable of service in war.

#### TUG FORTUNE AND OTHER BOATS.

The tug *Fortune* was transferred to this station in November last. She furnished excellent quarters for the enlisted men and is of great value to the work of the station.

Her engines and boilers are in good order and her hull is sound. She was docked in March last at the New York navy-yard for the purpose of giving an opportunity to examine the paint on her bottom, which was put on as an experiment. Her bottom at that time was cleaned and painted with another experimental paint. When she is again docked the rudder should be taken out and the rudderhead straightened. This was bent out of line before her transfer to the station, and causes the vessel to steer with difficulty.

The *Fortune* was of great service last winter, when it became necessary to transfer a large quantity of gun cotton and other torpedo material to New York for shipment to the Pacific Coast.

The boiler of the ferry launch has been given considerable repairs, and the boat is now in good condition. The other steam launches are in as good order as their age will permit.

The old launch used by the divers is entirely worthless and has been taken out of the water. Another divers' launch has been constructed out of the brig *Toy*, turned over to this station by the training station.

#### TORPEDO OUTFITS, ETC.

Outfits, or partial outfits, have been supplied during the year to the *Kearsarge*, *Miantonomoh*, *Ranger*, and *San Francisco*; to the Naval Academy, the Mare Island navy-yard, and the Marine Barracks at Washington.

One hundred service spar torpedoes, with spindles and pins, and 500 detonators have been sent to Mare Island.

For experimental work and for issue to the service there have been made up 102 service and 151 exercise torpedoes. There are on hand 63 service and 49 exercise cases, already fitted, and 120 service cases on hand in the shops.

Four spar-torpedo outfits are in store and six others in process of manufacture.

Heretofore it has been found difficult, sometimes impossible, to withdraw the blocks of wet gun cotton from the service torpedo cases without breaking them, on account of their snug fit. This has been remedied by increasing very slightly the interior dimensions of the cases without materially adding to their weight.

No other changes have been made in the outfit.

A set of outrigger spars for a torpedo-defense net have been made from designs by the Bureau and are now awaiting trial.

#### TORPEDOES.

The automobile torpedo constructed from the designs and drawings of Lieut. M. E. Hall, U. S. Navy, was, with the exception of the air flask, practically completed at the date of my last report. Unforeseen difficulties in the manufacture of the flask have been encountered and the torpedo has not yet been subjected to a trial run.

Lieut. Hall's previous experience had led him to the choice of aluminum bronze as the material of which the flask should be composed. The Aluminum Brass and Bronze Company, of Bridgeport, Conn., had expressed confidence in its ability to produce a cylinder of that material which would comply with the required specifications. An order for the flask was accordingly placed with that company in December, 1890. The company made six unsuccessful efforts to produce a cast flask, to be subsequently forged hot and hammered cold. It then abandoned the attempt.

A design for a flask of aluminum bronze, with brazed and riveted joints, was then made, and a proposition was submitted by the Bridgeport company to construct such a flask and guarantee it to withstand a pressure of 1,500 pounds to the square inch. The proposition did not meet the approval of the Bureau.

In the meantime an order had been placed with the Carpenter Steel Company, of Reading, Pa., for the construction of a forged-steel flask, but the company was unable to fill the order.

In December, 1891, it having been up to that time impossible to obtain a flask of any material, the Bureau gave an order to the Bethlehem Iron Works for a forging for a steel flask. The rough-turned forging was received in March last. It was at once put into the lathe and work begun on it. The forged cylinder was 6 feet 4 inches long, 15 inches outside diameter, and  $1\frac{1}{4}$  inches thick. It was necessary to bore and turn this cylinder to a diameter of 14.2 inches and one-fourth inch thickness, and to remove more than 900 pounds of metal from it. As the metal was very hard, the turning and boring were long and tedious operations. But they were at last completed, and the heads were fitted and sweated in with tin. The flask was then subjected to an oil pressure of 2,200 pounds, when leaks developed necessitating the cutting out of the tin and the introduction of a fillet of solder. This proved to be tight. The flask was finally finished on August 4.

The torpedo was then assembled and the mechanism tested with 400

pounds air pressure in the machine shop. It was found that the reducing valve did not work properly, and that the governor was too lightly constructed and broke down. These defects were remedied and the mechanism again tested in the shop the latter part of August. The reducing valve and governor now operated well and the engine worked satisfactorily.

When placed in the balancing tank, however, the torpedo, owing to an unexpected increase in the weights of the controlling mechanism and engine, over those calculated, did not balance properly, and it was necessary to reduce them. This has been done without impairing the efficiency of those parts, and the torpedo is now ready to go into the balancing tank again.

A launching frame, by which the torpedo can be lowered into the water before discharging it, has been constructed, and I confidently hope to get a trial run of the torpedo before the end of the present month.

For charging the torpedo the Burleigh Rock Drill Company's air compressor will be used. This compressor, which has been in use with the carbonic-acid apparatus, was duplex, and was not adapted to higher pressures than 700 pounds to the square inch. It has been compounded by inserting a liner in one of the cylinders and changing the lead of the pipes. It is now capable of charging the torpedo to a pressure of seventy atmospheres in something over an hour and will answer every purpose.

The second and third Patrick torpedoes had their final speed trials during the year, and were accepted by the Department. Two of these torpedoes were shipped to the Pacific coast in January last; the other remains at this station.

The contractor's trials of the Howell torpedo have been continued with more or less regularity throughout the year, and with considerable assiduity during the past summer. One of these torpedoes has been accepted, and it is thought that others will soon be presented for official trial. Every facility has been afforded to the Hotchkiss Company in the progress of the work.

The defense mine, for which a design was provisionally approved by the Bureau, has been constructed and experimented with. Lieut. Marshall, who has carried on the experiments with it whenever the weather and his other duties would permit, reports that the mine works well, with the exception of the battery and the circuit closer. The batteries so far used have proved failures, but it is believed that we are in the way of obtaining a form of battery that will prove durable. Two forms of circuit-closers are also being made for experiment.

Lieut. Marshall, however, urges certain objections to the present mine case and suggests changes which are at present under consideration. The most important of these are the substitution of a spherical case for the present form and the reduction of the explosive charge. No change, however, will be recommended to the Bureau until the present mine is exhaustively experimented with, which can not be done until a reliable battery and circuit-closer are provided.

#### ELECTRICAL LABORATORY.

Lieut. McLean has continued in charge of the electrical laboratory and of all the electrical work of the station. In addition to these duties he has been the inspector for the Department of the Whitehead tor-



pedoes in course of manufacture by the E. W. Bliss Company, of Brooklyn, as well as a member of the naval torpedo board.

Among the most important work of the laboratory for the past year are the investigations made for the purpose of finding or developing a form of voltaic battery of small size and low internal resistance for service use. The battery sought for is one that, after being charged, would require but little attention, and at the same time remain, for prolonged periods, always ready for use. Some very good results have been obtained, but further investigation in this direction is necessary. Battery cells of this description, whether they are of the so-called dry type or of the ordinary type, require to be hermetically sealed, and this condition seems to be almost incompatible with their integrity and reliability when subjected to the ranges of temperature through which they are likely to be used.

Experiments have been made to determine the time intervals between the beginning of the pull on the lanyard of a gun and the projection of the ignited powder from the mouth of the primer. The arrangement of the experiments was such that actual conditions in aiming and firing at moving targets were obtained. The time intervals were measured with a Boulenger chronograph. Both percussion and friction primers were used, and different gunners were employed. The results were very satisfactory.

Ballistic tests of the smokeless powders manufactured at the station in the small-caliber rifle have continued throughout the year under Lieut. McLean's direction. The best apparatus obtainable and the most approved methods are used in making the tests.

The electric fire-alarm system, arranged two years ago, continues to give satisfaction. The condition of the system is tested daily at noon. Preparations are making for placing automatic heat-alarm devices in the buildings devoted to the manufacture of explosives. These buildings are also to be lighted from the general system, the circuits being situated entirely outside the buildings, and the lamps so placed that sufficient illumination will be obtained, either for night work or for night inspections.

The change in the position of the conning tower of the *Stiletto*, consequent upon the fitting of the bow tube for the Howell torpedo, necessitated a new compensation of the compass of that vessel. The errors of the compass in the new position have been determined and tabulated and arrangements made by Lieut. McLean for compensation. He has also determined from time to time the compass errors of the *Fortune*.

The time ball continues to be dropped at noon of the seventy-fifth meridian by telegraphic signals from the Naval Observatory at Washington. A recording chronograph and two break-circuit chronometers serve for checking the time signals received and detecting errors or irregularities of transmission over the telegraph circuits.

#### CHEMICAL LABORATORY.

A large amount of work has been performed in the chemical laboratory under the direction of Prof. C. E. Munroe. Some twenty-five topics have been made the subject of investigation, in addition to the regular work of the laboratory, in the analyses of the various materials used in the processes of manufacture and the product of the gun-cotton and smokeless-powder factories. In all, 5,207 determinations have been made in 2,214 samples of material. The chemist's reports on many of these subjects have been forwarded to the Bureau. The others

have been placed in the station files. One of the most important of these, as bearing upon the manufacture of certain smokeless powders, is that of the volatility of nitroglycerine, to which reference is made in another portion of this report.

A furnace for the manufacture of calcium phosphide has been erected and 154 pounds of this substance have been manufactured during the year. The materials used for making the calcium phosphide have been furnished, in a large measure, by the Hotchkiss Ordnance Company, the phosphide being used by them in their trials of the Howell torpedo.

The manufacture of mercury fulminate and the filling of detonators have been carried on as required. Eight hundred and seventy-one detonators have been filled.

An exploder for use in the automobile torpedoes has been devised and a large number of experiments made with it.

An investigation, directed by the Bureau, of a method proposed for the rapid carbonization of mild steel by exposing it, while heated, to the action of carbonic oxide under pressure has been carried on, but the experiments have led to no practical result.

A large portion of the work of the laboratory has been the study of the smokeless-powder question with a view to the improvement of the processes of manufacture, the securing of uniformity in the raw materials used, the arrangement of and ignition of charges, etc. Sixteen samples of foreign and domestic powders of this class, and the same number of percussion caps, have been examined and reported on.

In addition to the work of the station proper, the chemist has carried on, for the Bureau of Equipment, an investigation as to the cause of the failure of the Thomson sounding tubes issued to the service. The cause was determined, the proper remedy found, and an agent of the Bureau was instructed in the method of coating the tubes, which have since given satisfactory records.

By direction of the Navy Department, certain samples of paints, oils, etc., have also been examined.

#### GUN COTTON.

Lieut. Commander Belknap assumed charge of the gun-cotton factory in October last, since which date the manufacture of gun cotton has been carried on with as little interruption as circumstances permitted. There was a delay of nearly seven weeks in December and January, caused by the nondelivery of acid, which went astray on the railroad somewhere on its way to Newport, and another of four weeks in July and August, when the floor of the dipping room gave way and work was suspended for the purpose of making repairs. In addition several weeks have been lost by the lack of steam or water at various times.

During the year 24,625 pounds of gun cotton have been made and 2,926 pounds of old gun cotton have been reworked, the total output of the factory being 27,551.3 pounds. Of this amount 10,172 pounds were molded in solid blocks for use in forming the charges for projectiles of the pneumatic gun. One thousand nine hundred and thirteen pounds have been used for making smokeless powder; the balance has been stored in the magazine at Rose Island. In addition, 10 pounds of long staple cotton has been converted for use in the manufacture of cannon primers, igniters, and detonators.

In January last 12,040 pounds (dry weight) of gun cotton, in powder tanks, and 100 loaded torpedoes, containing 3,456 pounds (dry weight)

of gun cotton, were shipped to the Mare Island navy-yard. The total amount of gun cotton on hand on September 1 was 17,607 pounds (dry weight).

The monthly output of the factory is shown by the following table:

*Monthly statement of manufacture of gun cotton.*

Month.	New gun cotton.	Reworked cotton.	Total.
1891.			<i>Pounds.</i>
September.....	1,094.5	689.8	1,784.3
October.....	3,253.2		3,253.2
November.....	3,012.9	441.3	3,454.2
December.....		945.6	945.6
1892.			
January.....	428.2	514	942.2
February.....	2,539.6	43.6	2,583.2
March.....	3,241.6	79	3,320.6
April.....	2,287.6	61.7	2,349.3
May.....	3,014.8	42.5	3,057.3
June.....	3,437.8	42.5	3,480.3
July.....	1,784.2	64	1,848.2
August.....	531		531
Total.....	24,625.4	2,825.9	27,551.3

A number of experiments have been carried on during the year, with a view to the substitution, for the cop waste heretofore used, of some other form of cellulose which would give better economic results. Among the substances tried were (1) cotton-seed pulp, a by-product in the manufacture of cotton-seed oil, obtained from T. Vincke, of Brenham, Tex.; (2) bleached cotton waste from the Massasoit Mills, Fall River, Mass.; (3) bleached waste from E. Butterworth & Co., of New York.

For purposes of comparison it may be stated that the average yield from cop-waste cotton is 1.7 pounds of gun cotton for each pound of cop waste dipped (after cleaning and excluding loss by "firing"). The cotton-seed pulp yielded but 1 pound of gun cotton per pound of pulp dipped, and it was very difficult to manipulate it. The bleached cotton from the Massasoit Mills yielded 1.13 pounds of gun cotton for each pound of cotton dipped. The loss was due to the disintegration of the cotton during nitration, and was probably owing to the destruction of the fiber by the process to which it had been subjected in bleaching. The sample of bleached cotton from E. Butterworth & Co. gave such good results that a supply was purchased and it is now in process of conversion.

The advantages of the bleached cotton are marked. Its use renders unnecessary the eight hours boiling with caustic soda, the eight hours boiling with fresh water, the washing in the wringer, and the preliminary drying of from three to five days that the cop waste cotton requires. Cop waste loses from 20 to 25 per cent of its gross weight in the processes required to prepare it for dipping; bleached cotton, though its first cost is somewhat greater, loses from 8 to 10 per cent only, and is actually cheaper in price when it reaches the dipping trough. Further, on account of its absorbent character, it sinks at once upon dipping, becoming thoroughly saturated, and exhibits a remarkable freedom from tendency to "firing" in both the dipping trough and digestion pot. The yield appears to be about equal to that of cop

waste per pound of cotton dipped, but this has not yet been determined with exactness.

On the other hand, on account of its absorbent nature, the bleached cotton takes up 25 per cent more acid when dipped than the cop cotton. This excess appears to be held mechanically and to be lost in the wringer and immersion tub. Bleached cotton fumes very freely, rendering its manipulation more difficult. Furthermore, it swells so much in nitrating that the digestion pots hold only one pound of it, while they take easily one and a quarter pounds of the cop cotton, and as only 100 pots can be conveniently dipped in a day, the output of the factory is decreased 42.5 pounds daily. Under ordinary circumstances this would be prejudicial to its employment; but as the loss by "firing" in summer is, with cop waste, rarely less than 5 per cent, and frequently amounts to 10 per cent of the amount of cotton dipped, while with the bleached cotton it is practically nothing, the saving on this account recommends its use in damp and sultry weather.

Samples of waste-woven cotton fabric received from Frank Bird, of Newark, N. J., have also been tried. The first of these samples, which was from bleached goods, gave very good results, but the dealer was unable to supply it in any considerable quantity. The second sample was greatly inferior to the first, but still offers certain advantages and a more extended trial of it will be made.

Acids from three sources, the Fairfield Chemical Works, of Bridgeport, Conn., the Dundee Chemical Works, of Newark, N. J., and the Kalbfleisch Sons Company, of New York, have been used during the year. While the last mentioned was slightly the cheapest in first cost, the difficulty experienced in freeing the gun cotton made with it from soluble matter and free acids renders its further use inadvisable. As between the Dundee and Fairfield acids, the former is cheaper in first cost, and at the same time the gun cotton made with it, so far as the tests applied show, is superior to that made with the latter.

The inspection of acids and other material offered for use in the manufacture of gun cotton has involved much labor and occupied a great deal of time, but the result has amply repaid the outlay. The saving in the cost of the acid alone, the material being still of the highest grade, is very considerable.

It is the practice in the factory to allow the gun cotton to remain in the digestion pots twenty-four hours after dipping. With a view to shortening this time, if practicable, an examination has been made of the degree of nitration of samples taken from the same digestion pot each hour of the twenty-four. In the one set of experiments made, it was found that the highest degree of nitration had taken place in twenty-three hours, after which denitration began. It would, however, be unwise to draw a conclusion from a single set of experiments and the subject will be investigated further.

In my report of last year reference was made to the unbalanced character of the plant of the factory, the capacity for certain operations greatly exceeding that for others. This defect has in a great measure been remedied by the additions made at that time. There were not on at that date, however, sufficient data on which to base an exact determination of the relative capacity of the various parts of the plant, the records of the factory having been very imperfectly kept. During the past year of nearly continuous operation, under the very efficient action of Lieut. Commander Belknap, the manufacture has been systematized and the details recorded in a manner leaving little to be de-

sired. The capacity of the plant at critical points in the manufacture may be stated as follows, the figures being based on cop waste:

	Pounds.
Gun cotton (125 pounds cop waste) that can be dipped daily.....	212.5
Gun cotton that can be—immersed daily .....	250
pulped daily.....	150
molded daily.....	270
pressed daily .....	300

It will be seen that the weak point in the system is the pulping. In case of necessity this is work that could be readily, though less economically, carried on at night. The output of the factory is, therefore, dependent on the amount that can be dipped daily. This is 212.5 pounds, equivalent to 63,750 pounds per year of three hundred working days.

The pulper now in use was installed in June, 1883. It will before long require a general overhauling and the replacing of portions of the woodwork and it may become advisable to purchase an additional pulper.

The number of workmen employed in the factory on October 1, last, was seven, with a daily pay aggregating \$16.75; at present there are five men, with an aggregate daily pay of \$10.75. In consequence of this reduction and of the lower price paid for materials, as well as the more careful attention to the details of manufacture, the cost of gun cotton has been very materially reduced. At the same time the quality of the gun cotton has improved, as is shown by the following comparison of lots of about 10,000 pounds each.

Gun cotton made.	Cost per pound.	Heat test; average.	Solubility test; average.
December, 1888, to June, 1889 .....	<i>Cents.</i> 49.4	<i>Min. Sec.</i> 20 10.5	<i>Per cent.</i> 5.11
August to December, 1891.....	50.8	25 57	4.98
January to May, 1892.....	41 1	32 50	4.13

In the cost of the gun cotton are included not only the labor and the materials actually employed in the manufacture, but also every item of expenditure in connection with the factory, coal, water, belting, rubber garments, tools, oils, grease, soap, etc. At the time the manufacture of the second of the above lots was begun (Aug., 1891) the factory had been idle for more than a year, the plant having deteriorated in the meantime and much new belting, etc., being required. The cost of that lot was, therefore, greater than that of the preceding one, the sultry summer weather also contributing to the excess by causing considerable loss by "firing."

An instance of supposed decomposition of 5 pounds of dry gun cotton was reported from the U. S. S. *Philadelphia* in March last. In response to the inquiries of the Bureau, instituted at my suggestion, the following information was obtained: The gun cotton had been received dry from the naval magazine at Fort Wadsworth in September, 1890. It had been stowed inside a locker, under the transom, in the pilot house. It had not been subjected to an unduly high temperature or to direct sunlight, nor were any other substances which could give an acid chemical reaction stowed in the neighborhood. Yellow spots appeared all along the edges of the blocks and protruded a little from the surface. The jars were filled with brownish red fumes. The identifying

marks on the blocks were not noted. It is to be regretted that this was not done in order that any peculiarity of its manufacture might be determined. It is only by having a complete history of any particular lot that a judgment can be reached as to the cause of its decomposition, and every block of gun cotton turned out of the factory is marked for this purpose.

Unlike the previously reported cases of alleged decomposition of gun cotton, the circumstances here certainly go to show that decomposition was taking place, unless, indeed, the observers were deceived in the indications. It was, no doubt, a justifiable precaution to destroy the gun cotton. Nevertheless I am disinclined to believe, if decomposition was actually taking place, that it was spontaneous. The experience of this station is all against such a result. Dry gun cotton has been kept under observation here for years, under conditions simulating those of the service, and no case of decomposition has ever been noticed. There are at present in a steam drier blocks of gun cotton that have been subjected to a temperature of 113° F. for nine months, which show no sign of change. Another block of dry gun cotton was wet with dilute nitric acid five years ago and stowed in a glass jar; it has been kept ever since, under varying conditions of temperature without exhibiting the faintest tendency to decomposition.

#### DUPONT GUN COTTON.

By direction of the Bureau, the writer, during the past month, visited the gun-cotton works of Messrs. Dupont & Co., opposite the city of Wilmington, on the Delaware River, for the purpose of inspecting a lot of 10,000 pounds of gun cotton just completed by the Messrs. Dupont under their contract with the Department. The gun cotton appears to be an admirable product, and, so far as the tests (not yet completed) have gone, it is well up to the high standard fixed by the Bureau and based on the product of this station.

I availed myself of the opportunity to inspect the gun-cotton works and was much struck with the completeness of the plant, that had been reached in so short a time.

#### SMOKELESS POWDER.

Continued progress has been made in the development of the Navy smokeless powder. The improvement of the methods of manufacture and the perfecting of the product have been the subjects of constant attention and study. If we have not succeeded in overcoming every difficulty that has confronted us, we are, at least, in a position to be certain of ultimate success.

Renewed and repeated experiments have increased the confidence in the stability of the powder, that was expressed in my last report. Portions of the substance have been exposed for hours to temperatures that would have quickly caused the decomposition of that most stable explosive, compressed gun cotton. Service gun cotton is accepted as standard if it will withstand, without decomposition, a temperature of 150° F. for fifteen minutes, and samples of it have been known to withstand that temperature for as long an interval as two hours. A portion of the smokeless powder, inclosed in an iron vessel and wrapped in felt, was maintained at a temperature of 208° F. for six hours and was absolutely unaffected. Another sample, similarly treated, was not affected until after twenty hours continuous exposure to a temperature

of 212° F. Recent reports of firings of powder that had been stored for six months, including an unusually hot summer, at Indian Head, show that ballistic qualities were unchanged. On the other hand a sample of the powder has been placed in a freezing mixture at a temperature of —5° F., and was unchanged at this low temperature. The nitroglycerin smokeless powders, it is reported, disintegrate at temperatures below the freezing point of nitroglycerin, about 39° F., and are therefore unfit for use in cold weather.

The reported insensitiveness to detonation by mercury fulminate has been confirmed by further experiments. Ten charges, taken from different lots of the powder, closely confined in iron cylinders, failed to explode with the service detonators, although the cylinders were ruptured and the powder scattered.

At the date of my last report, although there had been many firings from a small caliber rifle, there had been but one series of trials of the powder either in the 3-pounder or 6-pounder Hotchkiss guns, and in guns of larger caliber the powder had not been tried at all. As illustrating the successive steps in the development of the powder I venture to collate here, from the reports made to the Bureau by the officer in charge of the proving ground at Indian Head, the results obtained during the year. These reports are all in the Bureau's files, but their presentation in a condensed form will be of value.

The powder fired in the 3-pounder and 6-pounder guns last year was in the form of nearly cubical grains. The best results obtained at that time were, in the 3-pounder gun, a velocity of 2,250 feet seconds with a chamber pressure of 14.8 tons, and in the 6-pounder a velocity of 1,920 feet seconds with 14.3 tons pressure, the charge in the latter case being 392 grams (13.827 ounces).

A powder was then made in a somewhat larger grain, but still of (approximately) cubical form. This was fired in the 6-pounder Hotchkiss in October, 1891, with the following results:

Round.	Charge.	Pressure.	Muzzle velocity.
	<i>Grams.</i>	<i>Tons.</i>	<i>Ft. sec.</i>
1.....	300	7.6	1,543
2.....	350	11.1	1,741
3.....	365	12	1,818
4.....	372	12.5	1,835
5.....	382	11	1,862
6.....	392	13	1,920
7.....	410	13.6	2,002
8.....	418	15	2,047
9.....	418	15	2,047
10.....	418	14.8	2,043

It will be noted that the pressures and velocities increased with great regularity as the charge was increased, except in the fifth round, where the indicated pressure was low. It is, perhaps, only a coincidence that the charge of 392 grams gave exactly the same velocity that was obtained from an equal charge in the previous firing, though with a considerably reduced pressure. The ultimate result, however, was that while the pressure was not allowed to exceed 15 tons, there was an increase of velocity from this powder of 125 feet seconds. This was a confirmation of the previously formed opinion that the character of the powder could be modified by changing the granulation, as with ordinary gunpowder.

About the same date (October, 1891) a small lot (6½ pounds) of the

powder was made in the form of cylinders, 0.07 inch in diameter and  $4\frac{1}{2}$  inches long, for trial in the 4-inch rapid-fire gun. One charge of 4.5 pounds of this powder was fired, which gave to a 33-pound projectile a velocity of 1,820 feet seconds, with a pressure of but 10.9 tons. This result was considered so promising, that a larger lot of the same dimensions was made, the density being slightly increased. The results obtained with it were as follows:

## 4-INCH GUN, 33-POUND PROJECTILE.

Charge.	Pressure.	Velocity.
<i>Pounds.</i>	<i>Tons.</i>	<i>Ft. seconds.</i>
4.5	10.3	1,845
4.75	11.5	1,945
5	13.6	2,046
5.15	14	2,080
5.25	14.2	2,083
5.30	15	2,122

A considerable quantity of the same dimensions, but again with slightly increased density, was now manufactured. The trials in the 4-inch gun were repeated, giving the results which follow:

## 4-INCH GUN, 33-POUND PROJECTILE.

Charge.	Pressure.	Velocity.
<i>Pounds.</i>	<i>Tons.</i>	<i>Ft. seconds.</i>
4.05	10.3	1,912
4.4	11	1,966
4.8	12	1,990
5.2	14.7	2,125
5.2	14.8	2,134
5.3	14.8	2,145
5.3	15	2,190

It will be observed that the charge of 5.3 pounds in this series gave the same maximum pressure that was obtained with an equal charge in the preceding series, with a somewhat improved velocity. This is the best result so far obtained from this gun, but I feel sure that it can be improved by increasing the diameter of the powder.

The same powder was tried in the 3-pounder and 6-pounder Hotchkiss guns, but as the length of the cylindrical grains was not adapted to the cartridge cases, they had to be broken up by hand, and consequently there was some irregularity in the loading. The firings also show that the diameter of the grains was too great for these calibers. The following were the results, three charges only being fired from each gun:

## 3-POUNDER.

Charge.	Pressure.	Velocity.
<i>Grams.</i>	<i>Tons.</i>	<i>Ft. seconds.</i>
390	9	1,915
425	11.25	2,177
425	12.6	2,315



## 6-POUNDER.

400	9.5	1,724
480	11.6	1,988
480	12	1,992

For the information to be obtained, a portion of the same powder was fired from the 6-inch gun, but with a light (77-pound) projectile, with the following results:

## 6-INCH GUN, 77-POUND PROJECTILE.

Charge.	Pressure.	Velocity.
<i>Pounds.</i>	<i>Tons.</i>	<i>Ft. seconds.</i>
9.5	6.5	1,728
13.125	9.9	2,131
15	11.9	2,281
16.5	13.6	2,415

Meantime a still larger size of powder was made for trial in the 6-inch gun. This was also in cylinders about 0.12 inch in diameter and  $4\frac{1}{2}$  inches long. The experience gained in manufacture was apparent in the appearance of this lot, of which 250 pounds were made. The results obtained with it were as follows:

## 6-INCH GUN (40 CAL.), 100 POUND PROJECTILE.

Charge.	Pressure.	Velocity.
<i>Pounds.</i>	<i>Tons.</i>	<i>Ft. seconds.</i>
11.5	5	1,466
15	7.9	1,784
18	11	2,060
20	13.2	2,212
21	14.4	2,312

One-half of this lot was reserved for storage, and after six months gave substantially the same results, showing the powder to have remained unchanged during that interval.

A charge of 10.5 pounds of this same powder, fired from the 5-inch gun with a 50-pound projectile, gave a velocity of 2,540 feet seconds with a chamber pressure of 15 tons.

While the results obtained from this powder in the 6-inch gun had never been surpassed by any foreign powder, so far as published reports show, it was thought they could be improved, and another lot of powder of still larger grain was made. This has been fired within the present month, and the results are here given:

## 6-INCH GUN, 100-POUND PROJECTILE.

Charge.	Pressure.	Velocity.
<i>Pounds.</i>	<i>Tons.</i>	<i>Ft. seconds.</i>
15	5.06	1,535
19	7.30	1,798
23	11.20	2,151
27	12.56	2,369
29	13.06	2,469
29	13.93	2,456

This record, I venture to say, has never been paralleled. Higher velocities have been reported with the B. N. powder from a 15-centimeter (5.9 inches) gun of 45 calibers, firing a projectile of 40 kilos (88 pounds), but they have always been accompanied by pressures higher by several tons. The powder referred to is probably the best of foreign powders.

These repeated successes of the smokeless powder, as it has been developed from caliber to caliber, justify the opinion expressed by the Chief of the Bureau in his report of last year that the use of ordinary gunpowder in calibers below 6-inch will be abandoned in the near future.

The form of powder hitherto used in the small caliber rifles, although the results obtained with it so far as pressure and velocity are concerned, have been excellent, is not entirely satisfactory. The powder is in the shape of square flat grains, a form from which a considerable irregularity in loading must occur, and in which the flame is not always uniformly communicated from grain to grain. The result has been that in many of the fires a few grains of the powder remain unconsumed. The navy powder is, however, not singular in this respect; it is said to be characteristic of many, if not all, of the foreign powders. Another somewhat objectionable feature is the necessity of using a small priming charge of rifle powder to effect its ignition. Efforts have been made to overcome both of these objections, but so far without entirely satisfactory results. A powder has been made which will ignite with the ordinary percussion cap, but it is rather more brusque than is desirable. Another powder has been made, which, while it burns with great uniformity and sufficient retardation, is not, so far, perfectly ignited by a percussion cap. The question of an appropriate primer is a very important one when smokeless powder is involved. The experience with the smokeless sporting powders shows that the cap requires as careful attention as the powder itself. The powder made here is capable of the most varied changes in its rate of burning, and the expectation that the present difficulties will be overcome is not unwarranted.

The continued investigation of the smokeless powders found in commerce and obtained from abroad confirms the statement in my last report that they lack uniformity in their chemical or physical constitution. Prof. Munroe has shown in an inquiry, referred to elsewhere in this report, that nitro-glycerine is volatile at all temperatures, the evaporation being naturally more rapid at high than at low temperatures. It is to be expected, therefore, that powders containing this substance, or any other volatile constituent, would undergo change in its ballistic qualities. Information received at the Station shows this to be the case in a marked degree with cordite, of which nitro-glycerine is one of the components.

The works for the manufacture of smokeless powder have been considerably extended during the past year, and Lieut. Commander Belknap was placed in charge on the first of July last, in addition to his duties as superintendent of the gun-cotton factory. The two establishments are very properly placed under the same direction, since the quality of one product is very dependent on the excellence of the other. While it may be claimed that the manufacture of the powder has passed the experimental stage, experiments are still carried on with a view to improvement, and in this work the valuable coöperation of Prof. Munroe is obtained. Lieut. Commander Belknap has himself introduced improvements in the manufacture, and it is believed that the

powder now making will show superior qualities. One important feature of the manufacture is the recovery of a large proportion of the materials used in the incorporation of the powder, the credit for which is due to Prof. Munroe.

There have been turned out of the factory during the year about 1,500 pounds of the powder. The increase in the output of the plant has been slow, necessarily, since the machines for performing the various operations have had to be devised and constructed as the necessity for them was recognized.

#### OTHER EXPLOSIVES.

The inspection of the emmensite filled into shells, and that contained in the original tin cases which were stored in June, 1890, for the purpose of observing its keeping qualities and its action upon metals under these conditions, has been continued monthly during the year. No change has been observed to take place in the explosive.

Another portion of emmensite, stored in contact with gun-cotton in a warm room, is apparently unaffected, and has caused no change in the gun-cotton.

Experiments have continued with the non-sensitive fuse mixture for exploding this substance and other nitro-substitution compounds. While very violent explosions have been obtained when the emmensite is in a loose, granular condition, it is a remarkable result that the explosion fails when the explosive is compacted. This was the case also when the shell charges were subdivided by distributing it in spaces separated by stiff shellacked paper.

The insensitiveness to shock of these substances and their high explosive powder make them most attractive subjects of study for shell charges. A series of comparative experiments with several of them has been begun.

The investigation of the changes which occur in the cocoa powders, even at comparatively low temperatures, has not yet been completed. A sample of the charcoal used in its manufacture has recently been received from the Messrs. Du Pont, and is now in the hands of the chemist for examination.

#### INSTRUCTION.

The instruction of enlisted men has continued, the distribution of time and subjects taught being the same as last year.

The average number of men under instruction during the year is twenty-one. Thirty-one have passed the examinations after a six months' course and qualified as seamen gunners; seven have been discharged at the expiration of their enlistments, of whom three have returned to complete the course; two were transferred to the general service, on account of lack of aptitude, and four on account of unsatisfactory conduct; one deserted.

Lieut. Commander Lyon is charged with the general supervision of the instruction and discipline of the enlisted men, and specially with the instruction in diving. Lieut. Marshall gives the instruction in torpedoes, Lieut. McLean that in electricity, and Lieut. Commander Belknap in the manufacture of fuses and explosives.

Diving continues to be a prominent feature of the course. The interest excited by the discovery last summer of an ancient wreck in 10

fathoms of water, west of the island, has not yet abated, the wreck continuing to furnish objects of curiosity. Several torpedoes have been placed and exploded in the wreck, and considerable material removed by means of a pump operated from a steam launch.

#### NAVAL MILITIA..

A detail of commissioned and petty officers belonging to the naval militia of Massachusetts visited the Station last summer. After the exhibition to them of the spar torpedo and an explanation of the methods of preparing it for use, they were taken out in a steam launch, and four torpedoes were exploded for their instruction and benefit.

At the request of the governor of the State of Rhode Island, Lieut. Marshall, with a detail of seamen under instruction, was sent to Bristol, for the purpose of giving a practical lesson in the handling of torpedoes to the members of the Rhode Island Naval Militia. The greater part of a day was devoted to detailed instructions, after which a very successful exhibition of the method of torpedoing a vessel and the removal of a boom obstruction was given before the governor and the members of the legislature.

#### WORLD'S COLUMBIAN EXHIBITION.

The preparation of an exhibit from this Station for the World's Columbian Exhibition has been in put in charge of Lieut. Commander Belknap, assisted by Lieut. Marshall and Prof. Munroe. The work is well in hand, and the shipping of the exhibit could be begun within a very short time after notice is received.

#### LIBRARY.

During the year 243 volumes have been added to the library, which now numbers 3,481 volumes. The card catalogue has been extended to a total of 4,100 cards.

#### SANITARY CONDITION.

The sanitary condition of the station continues good. A thorough and rigid inspection was recently made by the surgeon, with reference to a possible epidemic of cholera in this country, but no changes in the sanitary rules were found necessary.

I am, sir, very respectfully,

THEO. F. JEWELL,

*Commander, U. S. Navy, Inspector of Ordnance, in charge.*

The CHIEF OF THE BUREAU OF ORDNANCE,  
*Navy Department, Washington, D. C*

REPORT OF EXPLOSION AT NAVAL MAGAZINE, MARE ISLAND, CAL.,  
JUNE 13, 1892.COMMANDANT'S OFFICE, NAVY-YARD,  
Mare Island, Cal., June 17, 1892.

SIR: I have the honor to submit a report, with accompanying papers, in regard to the lamentable disaster of the 13th instant.

At about 11:30 a. m. of that day, being in my office, I was startled by an explosion. I immediately left my office and started for the water front to ascertain the cause. As I passed out of the office building the fire alarm was sounded and I hastened to the gate-house, in the vicinity of which our fire department assembles. Before reaching the gate-house I was informed that the dock boiler had exploded. I knew that report to be absurd, as I had just passed the building that contained the boiler. When near the gate-house I met Capt. Watson, who stated that he feared the explosion was at the magazine. I knew that it could not have possibly been the main magazine, as the shock had not been severe enough to shake the chandelier directly in front of my desk. I repaired to the central telephone office at the gate-house to procure definite information, if possible. We received no response from the magazine, but were informed from the light-house that the explosion had occurred across the bay at Rodeo Station. As the fire engines were all ready, I stated to Capt. Watson that it would be a good fire drill anyhow to have it at the magazine. The first engine and hose carts started immediately, followed very soon by the second and all of the fire department. Surg. A. M. Moore volunteered to go to the supposed scene of the disaster, and I told him if he would collect his appliances I would send him there in the launch *Lively*. About this time the stable-keeper, Mr. Nichols, drove down to the gate-house and stated that he had been told the explosion was at the magazine. As Capt. Watson had fairly started the fire brigade on its way to the magazine he jumped into the wagon and reached the magazine grounds in time to take charge. Just after Capt. Watson started I received another message from the light-house contradicting the first and stating that the filling house had blown up and that several were killed and wounded. This was followed by a similar message from South Vallejo. The pilot of the ferryboat *Ellen*, James Maguire, offered to take the workmen down to the magazine to render assistance if their services were needed. As the *Ellen* contains a powerful steam pump, I directed Maguire to start at once. The launches *Lively* and *Pinafore* were also dispatched to render assistance. Commander Glass and Carpenter Burroughs, having volunteered, were also sent. Mr. George Handscom (electrician) had hastened to the magazine with a spare telephone and placed me in communication with Capt. Watson, who reported the particulars of the disaster as far as then known, and informed me that the danger from fire was over, but that as a precautionary measure he would keep playing on the ruins. About an hour later I received verbal reports of the particulars, and soon after that I was furnished with a list of the killed and wounded. The full particulars of what occurred on the grounds are contained in the reports submitted herewith. I have carefully investigated and questioned everyone who could possibly throw any light on the cause of the explosion, and no one can assign any possible reason. My own theory is that a shell was exploded while being fused, which would account for the two almost simultaneous explosions witnessed by Gunner

Johnson, the interval being about like the time difference in sound between the explosion of a primer and a gun. The ordnance officer of the yard, Commander C. E. Clark, having interrogated the chief mate of the British ship *Ilala*, informs me that the mate confirms the statement of Gunner Johnston. The explosions were almost simultaneous, but the ear could detect the difference. The *Ilala* is at Starr Mills Wharf, directly opposite the magazine. If the mass of powder had been ignited there would have been one heavy explosion, followed at intervals by the explosion of shell as they became heated in the burning building.

The victims of the disaster were buried with military honors in the naval cemetery.

It affords me great pleasure to call the attention of the Department to the gallant services of the following-named officers and men: Gunner Thomas M. Johnston, assisted by Surg. D. O. Lewis (the first officer arriving on the grounds), and Watchmen Damstedt and Collins handled the hose, although surrounded by bursting explosives. They were soon joined by Capt. J. C. Watson and Commander C. E. Clark. Capt. Watson took charge and gave new evidence of his well-known heroism in mounting the roof of the shell-house and extinguishing the burning fragments thrown there by the explosion. Commander Clark directed the fire party under Capt. Watson's orders, and having perfect knowledge of the ground, knew exactly where to look for danger. Capt. Watson calls attention to the gallant conduct of a number of officers and men. The particulars are contained in his report.

I respectfully call the attention of the Department to the report of Lieut. T. S. Phelps regarding the heroic conduct of the boat's crew of the English ship *Ilala*. I have already thanked them through their captain, and have also thanked the captain of the *Amador* for coming to the magazine wharf and offering assistance. I transmit herewith reports from the officers having any knowledge of the occurrence.

Very respectfully, your obedient servant,

JOHN IRWIN,  
*Rear-Admiral, Commandant.*

The SECRETARY OF THE NAVY,  
*Navy Department, Washington, D. C.*

Twelve inclosures, being reports from the following-named officers, viz:

Capt. J. C. Watson, captain of yard.

Commander C. E. Clark, inspector of ordnance.

Gunner Thomas M. Johnson, gunner at magazine.

Medical Inspector G. W. Woods, in charge of hospital.

Surg. D. O. Lewis, on duty at the hospital.

Lieut. T. S. Phelps, jr., executive officer, *Independence*.

Capt. G. C. Wiltse, commanding U. S. S. *Boston*.

Lieut. Commander W. T. Swinburne, executive officer of *Boston*.

Lieut. E. K. Moore, U. S. S. *Boston*.

Ensign D. F. Hughes, U. S. S. *Boston*.

Surg. A. F. Magruder, U. S. S. *Boston*.

First Lieut. of Marines H. L. Draper, U. S. S. *Boston*.

OFFICE OF THE CAPTAIN OF THE YARD,  
*U. S. Navy-Yard, Mare Island, Cal., June 15, 1892.*

I have to report that on Monday, June 13, 1892, between 11:30 and 11:35 o'clock I saw and heard an explosion, apparently beyond or to the south of the magazine wharf, followed very soon by a second. The first impression was that it was

the beginning of a salute from an arriving vessel; but almost immediately I believed that the disaster had occurred at the magazine, and at once sounded the general fire alarm, directing Mr. Hoffman to telephone you that I believed the explosions were at the magazine, and ordered both fire engines taken to the magazine beach without delay, and steam gotten up in the *Pinafore* and *Lively* ready to take me to the scene. After giving these orders, and before I could start in the *Lively*, a telephone message was delivered to me from the light-house that the explosion was not at the magazine, but was on the other side of the Straits of Karquines. When this was reported I so telephoned to your office (I have since ascertained that you did not receive either message, because you left the office immediately on the alarm), and sounded a fire alarm in the third district for drill, called back the engines, and began assembling and stationing force. Lest there might be some mistake, however, I had a telephone message sent to the magazine to find out whether anything was wrong there. As soon as I found no answer could be obtained, I directed the Farragut fire engine to proceed as rapidly as possible to the magazine beach and a hose reel dragged out behind a cart.

Mr. W. D. Nichols, stable-keeper, drove up from the stable at this moment and said workmen on the road thought it was the magazine. At first I directed him to take Dr. Moore, while I went in the *Lively*, but thinking I could possibly reach the scene more quickly by road than by water, and that prevention of further disorder was more necessary than attending the wounded, I drove as rapidly as practicable to the magazine and left the launch for the doctor. You were then standing in front of the guardhouse near the landing receiving messages from the light-house and trying to telephone to the magazine. I reported to you in passing, and you told me you had just received positive assurances from the light-house that the explosion was not on the island, but that I could take one of the engines with me for drill, and that you would send Dr. Moore in the *Lively* to the supposed scene of the disaster, with orders for him to stop at the magazine wharf to see if there was anything wrong there. On the road beyond the hospital we met Frank St. John, who, in accordance with directions from the stable-keeper, had ridden out to find whether the explosion occurred in the magazine grounds. One word from him showed the urgency of the case, and he was told to report at once to the commandant.

Just as we were driving around the southeast corner of the cemetery we met the ambulance. Before reaching the bluff, on which stand the gunner's and nearest watchman's house, saw boats from the *Boston* and *Independence* landing on the beach under the bluff, and sailors, officers, and others, pushing their way towards the magazine inclosure; a group of people on the bluff near the watchmen's houses were signaling them frantically not to go that way. I shouted and waved to them to come up the hill. Maj. Bartlett's wagon, containing himself, Lieut. Turner, officer of the day, and two others, I think, were just in advance of me.

As we drove up to the steps leading down into the magazine grounds a dreadfully mangled body was seen on a stretcher in front of the gunner's house. Seeing Mr. Maxson, civil engineer, U. S. Navy, on this bluff, I either personally directed him or sent him the message through Mr. Nichols not to let anybody else come into the inclosure until I signaled or sent word they were needed. At his suggestion I subsequently directed that those on the bluff be kept further back.

When I reached the ruins Gunner Johnston, two most efficient magazine watchmen. Collins and Damstedt, and a laborer named Albert Sylvester, working on the road for the department of yards and docks, were flooding the burning ruins through a hose led from one of the magazine hydrants. This, I believe, Mr. Johnston and Damstedt had commenced doing at the earliest possible moment after the second explosion. Dr. Lewis, who was the first commissioned officer to arrive on the spot after the accident, reports to me he found Mr. Johnson so employed and a man who answered to Damstedt's description assisting him; that Mr. Sylvester went down the steps with him and assisted him to straighten and stretch the hose at his (Johnston's) request so he could get the nozzle nearer the fire.

As soon as I reached the grounds I made a rapid examination of the smoldering ruins and Shell-House No. 2 inside and out, and asked a question of Gunner Johnston. I directed the Farragut fire engine to be brought in, taken out to the end of the wharf, and two streams to play on the roof of that shell-house, from which smoke was just now seen to be rising. Until additional streams could be had the only one of them playing was diverted from the ruins to this roof, and before the hose could be led and coupled to the engine I learned of a second magazine hydrant; had the remaining magazine hose and a section from our hose reel coupled there, and started to take this hose up a ladder onto the roof for more effective service, but was outstripped by a seaman apprentice, first class, C. H. Beamer, from Boston, Mass., attached to the *Independence*, and, I think, another first class, S. A. J. Murmann, of Pensacola, Fla., attached to the U. S. S. *Boston*, also got ahead of me. At any rate, both of them mounted the ridge of the roof and handled the nozzle coolly and efficiently.

While I was giving the first orders after arriving Commander C. E. Clark, U. S. Navy, appeared at my side and took immediate charge under me, making as critical examination as possible of this injured and smoking Shell-House No. 2, then directed a stream of water in between its roof and walls, and had a careful examination made of the grounds to see that there was no danger of the fire spreading anywhere else. In the meantime I did not consider there was much danger from the shell-house with our supply of water, and as there appeared to be no active combustion anywhere in the ruins of the filling-house I made no objection to the officers, sailors, marines, and fire department generally coming in the inclosure, first forming a line of bucket men to throw additional water on the embers. As soon as I deemed it right to do so I directed Lieut. Moore, U. S. Navy, in command of a number of officers and men from the U. S. S. *Boston*, to clear away the ruins and remove any doubtful ammunition and authorized Lieut. Gleaves, of the same ship, one of the officers who came with Mr. Moore, to look for and remove the bodies. Several very badly charred boxes of brown powder were thrown overboard by my orders, Commander Clark advising it. He gave me the most efficient assistance, and I agree with him that the presence of mind and prompt action of Gunner Johnston, with the assistance of Damstedt, Sylvester, and Collins, prevented a greater disaster. It thrilled me to see how unflinchingly men and officers worked, surrounded by the horribly mutilated bodies of those who were shipmates of some of them, and with the knowledge that there was some danger of their incurring the same fate by being there. Among others I remember the following officers as reporting to me: Lieut. Commander Swinburne, of the U. S. S. *Boston*; Lieuts. Moore and Gleaves, Ensign Hughes, and others, from the same ship; Lieut. Phelps and Boatswain Sheean and Sailmaker Redstone, of the *Independence*; Lieut. Lefavor, U. S. Navy, and Lieut. Turner, U. S. Marine Corps; Sailmaker Barr and Boatswain Haley, U. S. Navy, and others from the navy-yard. The crews of the fire engines deserve equal credit—Messrs. Horn and Bryant, of the *Farragut*, and O'Hara and Cleveland, of the *Sloat*. Mr. Lewis Vance, nozzleman of the *Farragut*, was conspicuous, standing in the middle of the ruins of the filling-house, drenching some heated shell. Thomas Kennedy, private, U. S. Marine Corps, from the barracks, reported to me very promptly as my orderly and followed me closely. Mr. Denio, foreman mason, and Mr. McCawley, writer, arrived early at the scene of action and rendered excellent service. Mr. Nichols, stable-keeper, was also there, prompt and efficient as usual.

Mr. G. E. Hanscom, in charge of fire alarms and telephones, followed me to the magazine and very soon connected a telephone on a frame filling house just opposite the ruins. He deserves great credit, and very soon enabled me to report to you the number of killed and wounded, and that I was convinced there would be no further disaster. In the meantime Commander Glass arrived in the *Lively*, bringing Dr. Moore, and later on you sent the *Ellen* with all the yard employés. As I found I did not need them I sent them off with thanks. The steamer *Amador* also came alongside the wharf and offered her services. I thanked the master and told him that we did not need any further help.

I would like to call special attention to Dr. Lewis's most prompt and efficient action, who, through the kindness and courage of Miss Beattie McDougal, was enabled to reach the magazine as soon as possible after the explosion. He did not only attend the wounded, but at the serious risk of his life helped to prevent further disaster; and as soon as convinced it was no longer necessary for him to stay, reported to me that he had already sent one desperately wounded man to the hospital, he would return there, help to dress his wounds, and prepare to receive the others. Later, at his suggestion, I had all the bodies taken to the morgue at the hospital. I did not leave the magazine until all fire was absolutely extinguished and the shells removed.

The *Farragut* fire engine was left there all night, and Commander Clark remained until after dark.

Very respectfully,

J. C. WATSON,  
Captain, U. S. Navy.

Rear-Admiral JOHN IRWIN, U. S. Navy.  
Navy Yard, Mare Island, Cal.

OFFICE OF INSPECTOR OF ORDNANCE,  
Navy Yard, Mare Island, Cal., June 15, 1894.

In obedience to your orders I have the honor to submit the following report of the circumstances concerning the explosion and fire at the naval magazine, as they came under my observation or were ascertained from the statements of gunner, Mr. Johnson, and the watchmen on duty there.



On my arrival I found that Capt. Watson had already taken charge, and that a good stream from one of the hydrants was playing upon the burning ruins of the brick filling house where the explosion had occurred. Smoke was rising from the roof of No. 1 shell-house, in which all the small-arm ammunition, fuses, and boxes of detonators were stowed. By his orders I undertook to extinguish any fire that might have started inside with the other hose which was now being connected, the stream from the first being turned upon the outside of the roof, and through the opening where it had been lifted from the walls by the explosion. Going inside I was unable to discover any flame and it is evident now that the smoke observed had been driven into the shell house through the opening referred to or came from burning fragments that had been thrown upon the roof. But the fire engines and the *Boston's* fire party having arrived, and water being freely thrown upon the ruins of the filling house, a hose was led in, and the ammunition boxes, the underside of the roof and the piles of empty shell boxes behind which fire might be lurking were thoroughly drenched. When this work was well under way I made a hurried examination of the magazine, No. 2 shell-house, and the partially destroyed wooden filling house, but failed to discover any signs of fire about them, and so reported to Capt. Watson, whose judicious orders I endeavored at all times to carry out.

It appears that the working party from the *Boston*, Gunner George Hittinger being in charge, was preparing ammunition for that vessel under the order to replace all she had used and to increase the allowance to 96 rounds for each 8-inch and 70 for each 6-inch gun, and as they had been engaged for several days putting up charges, and had only just commenced to fill shell, the probabilities are that some accident with the latter caused the explosion. As you have already been informed, Mr. Hittinger and eleven of the men were instantly killed, and those wounded were not able to give any definite information, but Mr. Johnston told me soon after my arrival at the magazine, and so states in his report, that he filled the first shell, and that all the necessary appliances were at hand. Four hundred and fifty pounds of shell powder in barrels and ten boxes of brown prismatic powder were taken into the filling house from the magazine that morning. The shell powder, several 6-inch shells, a number of rounds of 6-pounder Hotchkiss that had been taken from the *Boston* to the magazine to be cleaned, and many of the 8-inch and 6-inch charges put in tanks must have exploded. Five 6-inch shells, loaded and fused, 26 rounds of 6-pounder Hotchkiss, two ruptured tanks with the charges in them, and several boxes of brown powder, the wood being nearly burned off, were taken out of the ruins when the fire was extinguished, or when it had been so far subdued that they could be reached and handled.

By their own statements of what had occurred and what they did, and from the accounts of others who first arrived and found them with a hose led out and standing near enough to play effectually upon the fire where so many explosions had occurred, with the mutilated bodies of the poor fellows with whom they had just associated lying about them, the conduct of Gunner T. M. Johnston and Watchmen Charles Collins and Neil C. Damstedt was truly heroic, and but for their unsurpassed bravery and good conduct a far more terrible catastrophe might have occurred. The other watchman, John Byrnes, did not assist in any way that I can discover, but as the surgeon, A. M. Moore, who dressed a slight wound on his arm, can not yet state how far he, Byrnes, should be held responsible for his conduct I ask that action in his case be deferred. I shall later submit a report upon the behavior of all, with recommendations that may seem proper.

As Capt. Watson was in charge, the conduct of all who were not on the ordnance rolls should not perhaps be commented upon by me, but I wish to give some expressions to the feelings that moved me when I saw so many officers, seamen, marines, and workmen bravely fighting a fire that they believed, as the sequel proved when the ammunition was taken out of the ruins, might at any moment send them to their death in the fearful shape in which it had just overtaken so many. I noticed particularly the sailors of the *Boston* and their officers, among whom I recognized Lieuts. Swineburne, Moore, and Gleaves, as they were more deeply affected by the loss of their shipmates. There are others whom I ought to mention lest their names might fail to be included in any official report. Surg. D. C. Lewis and Albert Sylvester, a laborer in the department of yards and docks, who were the first to arrive, and assisted in leading out the hose or in keeping the stream directed upon the fire. A boat manned by the second officer and several men from a British ship lying at the wharf across the river pulled directly over, took the two wounded men to the launch that was bringing Lieut. T. S. Phelps and Aast. Surg. J. E. Page, and then returned to render any assistance that might be asked. The name of the vessel, that of the first officer in charge, and those of the two officers and the men in the boat will be obtained with a more detailed account of the services rendered. W. H. McKeagh, who is employed by Mrs. E. V. Cutts, I found in the shell room with me assisting the sailors who were dragging the hose. John Brough, the lead-

ing man in ordnance, and those he brought with him, deserve credit for reaching the magazine so quickly, as they came from the farther end of the yard.

As one filling house is wholly and the other partially destroyed the difficulty of carrying on the work of preparing ammunition is a serious one. I have had the boxes of detonators put in the watch-house on the wharf, and as the small-arm ammunition and fuses are stowed in the rear end of No. 1 shell-house, where the roof is but slightly injured, and as there is a partition with openings that can be closed, the front end can be used as a filling house temporarily. The roof is so much injured that it will all have to be replaced, but the work of extensive repairs should be deferred until a filling-house has been built.

The rear end of the wooden filling-house might be used for some purposes if slight repairs were made, but, in my opinion, this building has always been a menace to the magazine, and being now partially destroyed should be torn down and a brick filling-house erected in its place.

The magazine and No. 2 shell-house are practically uninjured, a few pieces of slate only being dislodged; the railroad track and fences are injured to some extent, and considerable labor will have to be expended in clearing away the ruins, especially of the brick filling-house which was destroyed. In my opinion another should be built on its site as soon as possible.

The estimate of the civil engineer, F. O. Maxson, of the damage done is, approximately, as follows:

Magazine.....	\$100
No. 1 shell-house.....	1,500
No. 2 shell-house.....	10
Brick filling-house (destroyed).....	2,800
Wooden filling-house (partially destroyed).....	225
Railroad.....	15
Fence.....	125
<b>Total.....</b>	<b>4,775</b>

The cost of new buildings that should, in my opinion, be erected, *i. e.*, two brick buildings that could be used either for shell or filling houses and that should be larger than the one destroyed, of repairs that should be made, and for the removal of what is left of the wooden filling-house would therefore amount to about \$8,500.

Very respectfully,

C. E. CLARK,

Commander, U. S. N., Inspector of Ordnance.

Rear-Admiral JOHN IRWIN, U. S. Navy,  
Commandant.

UNITED STATES NAVAL MAGAZINE,  
Mare Island, June 14, 1898.

SIR: About 11:30 yesterday morning the brick filling-house (within which was a working party from the *Boston*, consisting of fourteen men in charge of Acting Gunner Hittinger) was blown to pieces and set on fire.

The working party arrived at 8 a.m. Some of them continued work from previous week of putting up charges for 8-inch B. L. R.'s; the remainder brought in the building from the dock forty-six 8-inch shell and fifty-seven 6-inch shell which had been taken down there to be cleaned of paint. The gunner had forgotten to bring his burster bags and had to send a man back for them. About 11 o'clock commenced filling the shell. I loaded the first one, explaining the manner in which it should be done, and the care to be taken, and remained in the building while three or four were being loaded. Every possible precaution was taken. Two old magazine benches were spread out and covered nearly the entire floor; copper funnels, copper scales, copper rods, and composition scales for weighing the charges were used. I explained to the gunner that morning that not having enough magazine shoes for a large party the men must go about in their stocking feet. To the best of my knowledge and belief it was done, as every man I saw, with two or three exceptions, wore their own shoes. The exceptions, which include the gunner, had magazine shoes. When I left the building, about 11:15, Gunner Hittinger was working with the men who were loading the shell. Four and one-half barrels of shell were in the building—sufficient to last about two hours. The barrels were loaded, the powder being taken from the bung holes. I was, without doubt, the last to see the entire party alive. About 11:30 the explosion occurred. I was about 300 yards off. It occurred in the north end of the

building, where the shell were being loaded. A second explosion occurred immediately after, leveling the walls and throwing wreckage in all directions. The building immediately took fire. I ran into the grounds, closed the doors and windows of Shell-House No. 2, in which the two magazine men had been working, led out and coupled hose to fire plug, assisted by Neil C. Damstedt, watchman, and Albert Sylvester, a laborer employed repairing road back of magazine; turned hose on fire, upon which we played about one minute, when we discovered a lot of burning wreckage alongside the magazine; this was put out in a few moments; again started on fire in the ruins; were joined by C. P. Collins, watchman, who had been struck a severe blow on head by some jagged missile. Dr. Lewis arrived shortly after and assisted us with the hose, as owing to the force of water it was with the utmost difficulty we kept the stream of water directed.

About fifteen minutes, as near as I could judge, after the first stream of water started, sufficient help arrived to start a second one. Capt. Watson arrived just about this time and took charge. The yard engines arriving shortly after, all danger from fire was soon over.

A working party from the *Boston*, under charge of Lieut. Moore, did good work clearing away wreck, getting out bodies, and removing any explosive still remaining to place of safety.

Five 6-inch loaded shell were taken out of the ruins; some 6-pounder fixed ammunition belonging to the *Boston*, and three or four boxes of brown prismatic powder, the wooden cases of which were badly burned. Not knowing what decomposition the intense heat might cause I had them thrown overboard.

I can not speak too highly of Damstedt, Collins, and Sylvester, who, in spite of the fact that explosions were taken place every few moments (evidently the 6-pounder ammunition) and that several dead and mutilated bodies were all around us, never flinched. Dr. Lewis, too, proved himself the right man in the right place.

The third watchman, John Byrnes, was seemingly stunned by the explosion, and could give us no assistance whatever.

An English vessel, the *Itala*, lying at Starr's Mills, sent over a boat and took some bodies off the dock or out of the water, I could not see which.

The steamer *Amador* came alongside the dock and offered assistance.

This is as plain and concise statement as I can possibly give.

Very respectfully, your obedient servant,

T. M. JOHNSTON,  
Gunner, U. S. Navy.

Commander C. E. CLARK,  
Inspector of Ordnance.

NAVAL HOSPITAL,  
Mare Island, Cal., June 15, 1892.

SIR: In response to your verbal order, received through Capt. J. C. Watson, U. S. Navy to furnish such information as I might possess in regard to the wearing of shoes by the victims of the late disaster at the magazine, Mare Island, Cal., June 13, 1892, I have to respond that all were barefooted, save Richard Reincke, seaman. He had a shoe upon each foot of the pattern issued by the paymaster, the sole sewed, the shank fixed with cable screws of brass, and the heels apparently new, attached with iron nails. Every foot was accounted for, the last being found on the day of the funeral and belonging to the body of J. Johnson, seaman. There is no evidence obtainable by me to substantiate the statement that John Briscoe, seaman apprentice, second class, wore shoes which were removed at the magazine after the accident.

Very respectfully,

G. W. WOODS,  
Medical Inspector, U. S. Navy, in charge of Hospital.

Rear-Admiral JOHN IRWIN, U. S. N.,  
Commandant.

U. S. NAVAL HOSPITAL,  
MARE ISLAND, CAL., June 13, 1892.

SIR: In compliance with your order I have the honor to state that at about 11:35 on the morning of the 13th of June, while standing in front of the hospital, I heard a loud report, which at first I took to be the first gun of a salute, but as I was as-

sured by some of the men that it was too heavy for that, and was probably an explosion at the magazine, I ran down the road, where I met the water cart running at full speed, and was told by the driver that the magazine had exploded. After running a short distance along the road, I was overtaken by Miss McDougal, who drove me rapidly to the gunner's house on the top of the hill overlooking the magazine. I ran down the steps, and upon reaching the ground in front of the wrecked filling house saw the bodies of three men lying, one of whom, Reincke, was alive. Just then Gunner Johnson sang out, "Light up that hose," whereupon I seized the hose and assisted in bringing it up nearer the burning ruins. I found Charles P. Collins, watchman, with wound of the scalp, which I hurriedly examined and assured him that it was not serious. I then heard Gunner Johnson say, "Shut these shutters," meaning the iron shutters of the shell house looking out upon the wrecked and burning filling house.

Fearing that there might be another explosion, I lifted Reincke and drew him under the protection of the shell house, which I then entered, and which was full of smoke, but I could see that the shutters had been closed. By this time the ambulance had appeared on the scene and Reincke was placed in it and driven to the hospital. I then ran up the steps and met Capt. J. C. Watson, followed by Capt. C. E. Clark, coming down. Hearing that two other men were injured and lying on the beach I went to see them, and found them being attended by Passed Assistant Surgeon Craig and Surgeon Magruder. Maj. Bartlett had driven me to where these men were lying, and he very kindly offered to do anything he could, but as the ambulance was then returned from the hospital, it was thought that that would be the best conveyance for the wounded men. I heard no one make any request that the injured men should be placed in the major's carriage, which, indeed, was entirely unsuited for the purpose.

Gunner Hittinger's body was found lying on top of the shell house after the explosion. The right arm was thrown over the head, the left arm was shattered and lying by his side, the left foot was blown off and was found lying in the grass the next day. He was badly burned about the head.

I am, very respectfully, your obedient servant,

D. O. LEWIS,  
*Surgeon, U. S. Navy.*

Rear-Admiral JOHN IRWIN, U. S. N.,  
*Commandant, Navy-Yard, Mare Island, Cal.*

OFFICE OF EXECUTIVE OFFICER,  
U. S. R. S. INDEPENDENCE,  
*Mare Island, Cal., June 15, 1898.*

SIR: I have the honor to state that on the day of the explosion at the magazine a boat's crew from the English ship *Ilala*, Capt. Parcell, lying at Starr's Mills, rendered great assistance in rescuing from the beach in front of the magazine the apprentices, Holden and Briscoe, who were terribly burned and whose clothing was on fire. The act performed by the boat's crew, which was the first boat to arrive at the scene of the disaster, was not only a humane one, but was a brave and gallant act, as the fragments of bursting shell were flying all about them; yet, regardless of danger to themselves, these brave men, bent on rescue, pushed onto the beach and rescued the two men and brought them off to our steam launch, which had just arrived as they were leaving the shore. I state these facts in the hope, sir, that some recognition of their services may be made, as, in my opinion, they are deserving of every encomium that can be given.

The names of the men comprising the boat's crew are James R. Carnon, second officer; F. A. White, third officer; John McKay, seaman; John Johansen, seaman, and E. H. Graham, apprentice.

Very respectfully,

T. S. PHELPS,  
*Lieutenant, U. S. N., Executive Officer.*

Rear-Admiral JOHN IRWIN, U. S. N.,  
*Commandant Navy-Yard, Mare Island, Cal.*

OFFICE COMMANDING OFFICER, U. S. R. S. INDEPENDENCE,  
*Mare Island, Cal., June 15, 1898.*

Forwarded.

C. S. COTTON,  
*Commander, Commanding.*

U. S. S. BOSTON, 2D RATE,  
Nary-Yard, *Mare Island*, June 13, 1892.

SIR: I respectfully report that at 7:45 this a. m., Acting Gunner George Hittinger, U. S. Navy, with 14 men, making 15 in all, left this ship for the naval magazine to continue the work of making up charges, cleaning, filling, fusing, and strapping shell for this ship.

They are supposed to have been making up 8-inch reduced charges, and filling and fusing 6-inch shell when the explosion occurred in the filling house which resulted in the immediate death of Acting Gunner George Hittinger, U. S. N.; Chief Gunner's Mate Thomas Seymour; Gunner's Mate C. O. L. Sundburg; Seamen William Washburne, F. Legat, William Rush, and J. Johnson; seaman apprentices, first-class, William Heckel and William Ostrander; Ordinary Seaman A. Ketvell; First-class Apprentice H. Joos; Landsman C. W. Smith; and in the serious wounding of Seaman Apprentice, first-class, J. H. Hulton; Seaman Apprentice, second-class, J. Brisco, and Seaman R. Reincke.

Riencke died at the hospital while his wounds were being dressed.

Assistance was immediately sent from this ship and everything that was possible was done. The cause of the explosion is unknown to me, and I can not conjecture as to the nature of its probable cause at this time.

Very respectfully,

G. C. WILTSE,  
Captain, Commanding.

COMMANDANT NAVY-YARD,  
*Mare Island*.

U. S. S. BOSTON,  
Nary-Yard, *Mare Island*, June 15, 1892.

SIR: I have the honor to submit the following report of matters connected with the catastrophe of the 13th instant coming under my observation:

By my direction, at the request of the navigator, a working party of 14 men, in charge of Gunner George Hittinger, were sent to the magazine to fill shell and make up cartridges for 6-inch and 8-inch guns, which work had been going on for a week.

About half-past eleven Lieut. E. K. Moore reported to me that an explosion had occurred at the magazine, and he needed a surgeon. The steam launch being ready I immediately called on both surgeons, who were present in the ward room, directing them to take instruments and the "emergency case." While giving this order the fire alarm sounded in the yard and I immediately went on deck and called away the fire party and directed Lieut. Gleaves to get them at once into the whale boat and steam launch and go with Lieut. Moore and the surgeons to the scene. As they shoved off another small explosion at the magazine was seen. I immediately started for the magazine by land, running and walking.

When I arrived the filling house was lying leveled to the ground, the debris still burning, and one stream playing on it while officers and men from this ship and the *Independence* were removing wreckage and bodies. The steam fire engine had just reached the dock and was coupling up the hose. A small stream of smoke was coming from the ridge of the roof of the shell house adjoining the ruins, on which the one available stream was immediately directed. I called some of our men and assisted in getting a hose attached to the hydrant to southward of shell house and the men led it to the top of the shell house, where the captain of the yard had climbed, who directed the nozzlemen.

Everything was soon under control and the men and officers turned their attention to clearing away the debris and removing the bodies. I saw and identified twelve, and then leaving an officer to attend to their transportation, returned to the ship.

I saw nothing that could give any clue to the cause of the disaster. Men, officers, and the employes worked with a will.

Very respectfully,

WM. SWINBURNE,  
Lieutenant-Commander.

Rear-Admiral JOHN IRWIN, U. S. N.,  
Commanding Navy-Yard.

U. S. S. BOSTON, 2D RATE,  
Nary-Yard, *Mare Island*, June 15, 1892.

Forwarded.

G. C. WILTSE,  
Captain, Commanding.

U. S. S. BOSTON, 2D RATE,  
Navy-Yard, Mare Island, June 15, 1892.

SIR: In obedience to your verbal order of this date, I have the honor to state that Acting Gunner George Hittinger was directed by me, on or about June 6, to proceed to the naval magazine on the following morning, with a detail of men to prepare ammunition for this vessel, consisting of 6-inch and 8-inch charges and shell, and to continue from day to day until the work was completed. Also, that the gunner at the magazine would furnish him with the necessary material and that he would do the work under his direction. On Saturday afternoon, the 11th instant, Mr. Hittinger reported that he had made up 41 6-inch full and 69 6-inch reduced charges, and 6 or 8 8-inch reduced charges; also, that he had the shell cleaned and nearly ready to fill. Five boxes (70 shell) of 6-pounder, fixed ammunition, had been prepared before; so I should say there was in the filling-house room for the *Boston* at the time of the explosion 70 6-pounder cartridges loaded, 41 6-inch full charges, 69 6-inch reduced charges, about 12 or 14 8-inch reduced charges, about 12 or 14 6-inch loaded shell, and many 6-inch and 8-inch empty shell; also the powder being used in putting up 8-inch reduced charges and filling 6-inch shell. On the 18th instant, at about 11:34, I both saw and heard the explosion at the magazine, and reported it to the executive officer, who directed me to proceed thither with the surgeons of the ship and a working party. A few minutes later I started in the steam launch towing a whale boat, having in all four line officers, two surgeons, and about thirty men. The steam launch of the *Independence* started at about the same time, and was a few hundred yards ahead of us. We landed on the side of the mound away from the fire. I crossed the hill and reported to Capt. Watson at the scene. Ensign Hughes, of my party, had preceded me, and he and Ensign Robison, of this vessel, were on the scene when I arrived. The latter had gone overland. At this time there were not more than eight persons at the fire, but many marines and others on the hills back. One stream of water was playing on the fire. I received orders from Capt. Watson to clear away the wreck and take out the remains on the north side. Almost immediately after my arrival Lieut. Gleaves and Cadet Carter came around the hill with our working party, and I think at the same time came the party from the *Independence*. Officers and men of both ships worked with a will, and this work was soon accomplished. I was then ordered to clear up where the fire had been, and in so doing found about a dozen 6-inch shell filled and fused and a number of 6-pounder cartridges not exploded; also some small-arm ammunition and several boxes of brown prismatic powder with the wood burned almost off, but the powder intact. The powder in the tanks was burned, and some of the tanks twisted as though they had exploded. Two tanks were found twenty or thirty feet from the building with the powder in them. I saw the bases of two 6-inch shell that had been exploded, also many pieces of 6-pounder shell. After the first explosion I heard several in quick succession, and later on others at longer intervals, but do not know how many. The working party consisted of Acting Gunner George Hittinger, one chief gunner's mate, one gunner's mate, and twelve other men. At the time of the explosion they are supposed to have been making up 8-inch reduced charges and filling and fusing 6-inch shell. Mr. Hittinger was a bright young man of more than usual intelligence; was an ex-apprentice and seaman gunner, and had gone through the gunnery instructions at Washington and Newport; had been stationed for a short time at the naval magazine at New York, so that he undoubtedly was well posted on the work at which he was engaged. The chief gunner's mate was an old man-of-war's man; had served with the rating, worked at putting up ammunition before, and was an experienced hand in the gunner's gang. The gunner's mate was also an experienced man, and thought to be an unusually careful one. The other men of the party were young and intelligent; some of them unusually so.

Very respectfully, your obedient servant,

E. K. MOORE,  
Lieutenant, U. S. Navy.

Rear-Admiral JOHN IRWIN, U. S. N.,  
Commandant Navy-Yard, Mare Island.

[Indorsement.]

U. S. S. BOSTON, 2D RATE,  
Navy-Yard, Mare Island, June 16, 1892.

Forwarded.

G. C. WILTS,  
Captain, Commanding.

U. S. S. BOSTON, 2D RATE,  
Navy-Yard, Mare Island, June 16, 1892.

SIR: In obedience to your verbal order of this date, I have the honor to submit the following statement:

On my return from the naval magazine, I was ordered by Capt. G. C. Wiltse, U. S. Navy, to accompany First Lieut. H. L. Draper, U. S. M. C., to the Naval Hospital, where he, Lieut. H. L. Draper, U. S. M. C., was to obtain such a statement as possible from J. Briscoe, seaman apprentice, 2d class, and J. H. Hulton, seaman apprentice, 1st class, the survivors of the explosion.

I heard the testimony as submitted by Lieut. Draper, and, though the men seemed conscious, I am of the opinion that from their rambling manner of speaking, and their intense suffering, that they were in no condition to remember or testify correctly.

Very respectfully,

C. F. HUGHES,  
Ensign, U. S. Navy.

COMMANDANT NAVY-YARD,  
Mare Island.

[Indorsement.]

U. S. S. BOSTON, 2D RATE,  
Navy-Yard, Mare Island, June 16, 1892.

Forwarded.

G. C. WILTSE,  
Captain, Commanding.

U. S. S. BOSTON,  
Navy-Yard, Mare Island, Cal., June 16, 1892.

SIR: In obedience to your order of this date, I beg leave to report that I questioned the apprentices, Hulton and Briscoe, a short time after the explosion, and again at the hospital while dressings were being applied to their burns. They both stated that they had no idea what caused the explosion; that they were both engaged in filling 8-inch charges with brown powder, and that the explosion did not occur with them. I asked them a number of other questions each, but their replies were so contradictory and rambling, and as they were more or less under the influence of opiates and suffering from shock and pain, I did not consider that any importance would attach to their testimony.

Very respectfully,

A. F. MAGRUDER,  
Surgeon, U. S. N.

Rear-Admiral JOHN IRWIN, U. S. N.,  
Commandant Navy-Yard, Mare Island, Cal.

[Indorsement.]

U. S. S. BOSTON, 2D RATE,  
Navy-Yard, Mare Island, June 16, 1892.

Forwarded.

G. C. WILTSE,  
Captain, Commanding.

U. S. S. BOSTON,  
Navy-Yard, Mare Island, Cal., June 13, 1892.

SIR: In pursuance of your order to go to the U. S. Naval Hospital, accompanied by Ensign Hughes, and obtain a statement of such of the injured men of this ship as were able to make a statement in regard to the explosion in which they were wounded at the magazine, I have the honor to submit the following:

JOHN BRISCOE, who was in his right mind, was examined as set forth below:

Q. How did the explosion occur?—A. This is mystery, and will be so always.

Q. Where were you when the explosion took place?—A. I was unscrewing a box of powder

Q. What were the men doing?—A. They were filling shells; a couple were putting up brown prismatic 8-inch charges.

Q. Where was the gunner?—A. The gunner was in the room helping to fill a shell.

Q. Did the explosion occur in your room?—A. Yes, sir; I think it was right along-side me.

Q. Was anybody hammering?—A. Not in the least.

Q. Did you put on any magazine clothes?—A. No, sir; we had on dirty working clothes, and were not required to shift.

Q. Where were you after the explosion?—A. I was blown about 15 feet. I know I went through the door. The moment I landed I rolled all over the ground; they put the fire out that was on me.

Q. Was anybody smoking?—A. No, sir.

Q. What time was it?—A. I don't know.

Q. What is your name?—A. John Briscoe.

Q. Did you have on the same clothes as when you left the ship?—A. No, sir; I had on dirty working clothes. I shifted in the same room that the explosion took place in.

Q. Did you see any of the men take articles from their own clothes and put them in the clothes they put on at the magazine?—A. Not a solitary thing, sir.

Q. Did you change your shoes when you changed your clothes?—A. No, sir.

Q. Did you wear the same shoes that you wore from the ship?—A. Yes, sir.

Q. Was there a light of any kind in the room you were in?—A. No, sir. Of course the room was lighted by natural light; there was no light burning there.

Q. Did you have any warning that anything was wrong before the explosion, such as a man saying to "look out" or "take care"?—A. No, sir; I did not even so much as hear a cry or a yell. Just after the explosion somebody on the dock yelled.

This ended the examination of Briscoe.

Examination of J. H. HULTON, who was in his right mind:

Hulton was recognized by Ensign Hughes.

Q. Do you know how this happened?—A. No, sir.

Q. What were you doing when this happened?—A. I was putting up 8-inch charges, and they were filling shell; they must have let a shell drop on loose powder.

Q. Was it where they were filling shell that the explosion took place?—A. Yes, sir.

Q. Did you see or hear a shell drop?—A. No, sir; or it was the carelessness of them two Dutchmen, Ketrul and the other (Hulton did not know the second man's name). They were fooling all the morning and racing to see who would fill the most shell.

Q. Did you have on magazine clothes and shoes?—A. No, sir; nobody had; we had on white working clothes that we put on on the ship.

Owing to surgical treatment this man could not continue.

I am, sir, very respectfully, your obedient servant,

HERBERT L. DRAPER,  
First Lieutenant, U. S. M. C.

Capt. G. C. WILTSE, U. S. Navy,  
Commanding U. S. S. Boston.

[First indorsement.]

U. S. S. BOSTON, 2D RATE,  
Navy-Yard, Mare Island, June 14, 1892.

Respectfully forwarded.

I am informed by Drs. Magruder and Craig that at the time these statements were made the men were suffering from extreme shock and collapse and were in no condition to reason or recollect correctly.

G. C. WILTSE,  
Captain, Commanding.





REPORT  
OF THE  
CHIEF OF THE BUREAU OF CONSTRUCTION AND REPAIR.

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NAVY DEPARTMENT,  
BUREAU OF CONSTRUCTION AND REPAIR,  
*Washington, D. C., October 15, 1892.*

SIR: In obedience to the Department's instructions, I have the honor to submit my annual report for the fiscal year ending June 30, 1892.

The estimates for the expenditures of the Bureau, as given in the statement marked A, are in accordance with existing laws.

The estimate marked B is for the general repair of vessels at navy-yards and on foreign stations, purchase of stores, materials, machinery, and tools of all kinds, preservation of material and stores, and for the general care and preservation of the Navy in the line of construction and repair.

The estimates in the statement marked C are for the pay of such clerks and writers at the several navy-yards as are indispensable for the proper and systematic prosecution of the work.

The estimate marked D is for the hull and outfits of new vessels.

APPENDICES E, F, G, AND H.

Appendix E is a list of vessels which have been repaired at the navy-yards during the fiscal year 1891-'92.

Appendix F is a list of the vessels of the Navy, divided into groups under heads of "Armored vessels," including single-turreted monitors; "Unarmored steel vessels," "Torpedo boats," "Iron steam-vessels," "Wooden steam-vessels," "Tugboats," and "Vessels unfit for sea service."

Appendix G contains reports from naval constructors showing condition of work July 1, 1892, on vessels building or completing at navy-yards or under contract at private yards.

Appendix H contains reports from naval constructors regarding improvements needed at navy-yards in the plants for shipbuilding or repair work.

ASSISTANT CHIEF OF THE BUREAU.

I beg to renew the recommendation contained in former reports as to the necessity of providing an Assistant Chief of Bureau.

The absence of the Chief of Bureau upon tours of inspection, or from sickness or other unavoidable causes, often results in serious delay to the technical business of the Bureau, and, as even much of the

routine work of the Bureau involves matters of the greatest technical importance, I feel it my duty to urge upon the Department the necessity for making legal provision for an Assistant Chief of Bureau, who, being fitted by experience and professional training, will be qualified and authorized to act during the absence of the Chief of Bureau.

#### CHIEF CLERK OF THE BUREAU.

The position of chief clerk in this Bureau is one of great importance, and the compensation is inadequate. The duties are arduous, and upon their satisfactory performance much of the efficiency of the Bureau depends. In view of the importance of the work performed, I respectfully renew my recommendation of last year, which met with your approval and was recommended to Congress, that the salary be increased to \$2,500 per annum.

#### DRAFTING WORK IN THE BUREAU.

During the past year plans and specifications have been begun for the armored cruiser and battle ship recently authorized by Congress, in addition to the large amount of detail design of plans for vessels already under construction.

The Bureau renews its recommendation that the position of chief draftsman, with a salary of \$2,500 per annum, be established for this Bureau, as the work in hand requires such an appointment, and a similar rating is at present allowed for the Bureau of Steam Engineering.

#### SURVEYS.

The following vessels have been surveyed and repairs ordered during the fiscal year 1891-'92:

Vessel.	Place.	Date.
Franklin .....	Norfolk, Va. ....	July 9, 1891
Kearsage .....	New York, N. Y. ....	July 7, 1891
Ranger .....	Mare Island, Cal. ....	Sept. 4, 1891
Adams .....	do .....	Sept. 29, 1891
Concord .....	New York, N. Y. ....	Oct. 21, 1891
Newark .....	Boston, Mass. ....	Oct. 24, 1891
Jason .....	League Island, Pa. ....	Oct. 29, 1891
Nahant .....	do .....	Do.
Atlanta .....	New York, N. Y. ....	Do.
Fern .....	Norfolk, Va. ....	Nov. 3, 1891
Chicago .....	New York, N. Y. ....	Oct. 31, 1891
Catalpa .....	do .....	Nov. 4, 1891
Dolphin .....	Norfolk, Va. ....	Nov. 17, 1891
Vesuvius .....	do .....	Nov. 18, 1891
San Francisco .....	Mare Island, Cal. ....	Nov. 25, 1891
Portsmouth .....	Norfolk, Va. ....	Dec. 12, 1891
Jamestown .....	do .....	Dec. 8 to 20, 1891.
Newark .....	do .....	Dec. 21, 1891
Baltimore .....	Mare Island, Cal. ....	Jan. 9, 1892
Fern .....	Portsmouth, N. H. ....	Jan. 21, 1892
Montauk .....	League Island, Pa. ....	Jan. 22, 1892
Passaic .....	Norfolk, Va. ....	Jan. 20 to 23, 1892.
Constellation .....	do .....	April 9, 1892
Palos .....	Nagasaki, Japan .....	June 30, 1892
Monongahela .....	Norfolk, Va. ....	May 14, 1892
Boston .....	Mare Island, Cal. ....	May 20, 1892
Chicago .....	New York, N. Y. ....	June 20, 1892
Kearsage .....	Portsmouth, N. H. ....	June 25, 1892
Franklin .....	Norfolk, Va. ....	May 14, 1892

*List of vessels stricken from Navy register from July, 1891, to July, 1892.*

U. S. S. Despatch.....	Oct. 28, 1891
U. S. S. Intrepid.....	Mar. 9, 1892
U. S. S. Galena.....	Feb. 29, 1892
U. S. S. Cohasset.....	Mar. 4, 1892
U. S. S. Tallapoosa.....	Feb. 24, 1892

#### THE SINGLE TURRET MONITORS.

The attention of the Department is again directed to these vessels, which are at present a source of expense and, not being kept in efficient repair, of no use whatever in an emergency. It is recommended that some action be taken by the Department by which such of them as are in condition to justify such an expenditure may be overhauled and thoroughly repaired, the remainder to be sold if found on examination not worth repairing.

These vessels can be made useful adjuncts to whatever other means the country may possess of repelling an enemy; their shallow draft renders them especially adapted for service in the smaller harbors of our own coast, which are inaccessible to seagoing armored vessels of modern design on account of their great draft, and where, consequently, the monitors would only be exposed to the attacks of unarmored cruisers.

#### THE WOODEN STEAM VESSELS OF THE NAVY.

The wooden steam vessels of the Navy are gradually disappearing from the active list.

During the past year the *Pensacola* and *Iroquois* have been put out of commission and laid up in ordinary at the navy-yard, Mare Island, California.

The *Tallapoosa* was condemned as unfit for further service and has since been sold. By recent act of Congress the *Kearsarge* and *Hartford* have been exempted from the operation of the 10 per cent limit for repairs established by the last Congress. Of the wooden steam vessels still borne on the Navy list, there are only nine in active cruising service, viz: *Lancaster*, second rate; *Marion*, *Mohican*, *Kearsarge*, *Adams*, *Alliance*, *Essex*, and *Thetis*, third rate, and *Yantic*, fourth rate.

The following vessels are in ordinary subject to the action of the Department: *Pensacola*, *Omaha*, *Swatara* and *Iroquois*; all of which are at the navy-yard, Mare Island.

During the past year the *Nipsic* has been fitted out as quarters for officers on duty at the new naval station on Puget Sound.

By direction of the Department, the *Enterprise* is to be turned over to the authorities of the State of Massachusetts to be used as a nautical school-ship.

#### WOODEN SAILING VESSELS.

Of the wooden sailing vessels, the only ones remaining on active duty in the navy are the *Portsmouth* and *Monongahela*.

The *Monongahela* has been completely overhauled during the past year, has had a spar deck added, and is now a most efficient and serviceable training vessel.

The *Jamestown* has been surveyed and found unfit for further active service and is now being temporarily used as a hospital ship at Cape Charles, Virginia.

## PROGRESS OF WORK ON VESSELS IN COURSE OF CONSTRUCTION.

The progress of work on vessels under contract, and those building at navy-yards, is on the whole satisfactory, but, in many instances, has been greatly impeded by the delay in supplying armor plates. It is believed, however, that the contractors for armor are now in a position to fulfill their contracts with greater rapidity and that delay from this source will soon disappear.

## LAUNCHES.

During the past year the following launches have taken place:

Name.	Type.	Displacement.	Date of launch.
		<i>Tons.</i>	
Detroit .....	Cruiser .....	2,000.0	Oct. 28, 1891
New York .....	Armored cruiser .....	8,150.0	Dec. 2, 1891
Montgomery .....	Cruiser .....	2,000.0	Dec. 5, 1891
Machias .....	Gunboat .....	1,050.0	Dec. 8, 1891
Narkeeta .....	Tugboat .....	192.4	Feb. 11, 1892
Wahneta .....	do .....	192.4	Mar. 3, 1892
Iwana .....	do .....	192.4	Mar. 12, 1892
Raleigh .....	Protected cruiser .....	3,183.0	Mar. 31, 1892
Bancroft .....	Practice cruiser .....	838.0	Apr. 30, 1892
Castine .....	Gunboat .....	1,050.0	May 11, 1892
Texas .....	Battle ship .....	6,300.0	June 28, 1892
Columbia .....	Protected cruiser .....	7,350.0	July 26, 1892
Marblehead .....	Cruiser .....	2,000.0	Aug. 11, 1892

Of the above vessels, the tugs *Iwana*, *Wahneta*, and *Narkeeta* have had successful trial trips and have been accepted by the Navy Department. The others are in an advanced state of progress and, with the exception of the *Texas*, will probably have their trial trips within the next year.

## NEW VESSELS.

In accordance with the provisions of an act making appropriations for the naval service for the fiscal year ending June 30, 1893, plans are being prepared for an armored cruiser of about 8,000 tons displacement, and a seagoing coast-line battle ship of about 9,000 tons.

## IMPROVEMENT OF NAVY-YARD PLANTS.

Although much improvement has been made in the shipbuilding plants at the several navy-yards during the past few years, there still remains much to be done to put them in proper condition for the efficient performance of the large amount of repair work which must necessarily follow the rebuilding of the Navy.

It is also necessary that these yards should be thoroughly equipped for building vessels of the largest class, so that in the event of an emergency the Department would not have to rely entirely upon private shipyards.

The accompanying reports from naval constructors (Appendix H) show the necessity for certain improvements at their respective yards.

From these reports it will be seen that new buildings, as well as tools, are greatly needed. This Bureau has requested the Chief of Bureau of Yards and Docks to include in his estimate of appropriations required for the next fiscal year the amount necessary to make the following repairs and additions to the buildings at the various navy-yards,

these improvements being considered by this Bureau absolutely necessary for the efficient and economical performance of work, and proper preservation of the valuable machine tools already installed:

Navy-yard, Boston, Mass.:

1. New plate rack and forge shed.
2. Larger doors in end of building No. 36 (joiner shop), so as to admit entry of loaded teams and furnish additional light.

Navy-yard, New York, N. Y.:

1. Refitting building No. 6 as offices and storerooms for construction and repair department.
2. Fitting ventilation shaft over boiler room of building No. 10.
3. New bending, flange turner's, and angle smith's shops, of steel or iron, to replace present temporary wooden structures.
4. Sheds at each dry dock for use of shipwrights and storage of appliances used in docking ships.
5. A new building of brick or stone to replace present temporary wooden structures Nos. 115, 117, and 118, now being used as punch shed, plate racks, etc.

Navy-yard, League Island, Pa.:

1. Brick building with corrugated iron roof to be erected adjacent to ship-fitter's shop, for accommodation of new boilers and engine.
2. New floor in ship-fitting shop.
3. New iron or steel shed for accommodation of plate and angle furnaces, bending slabs, punches, shears, etc.
4. New brick building for smithery, foundry, coppersmith's, and plumber's shops and galvanizing tank.

Navy-yard, Norfolk, Va.:

1. Erection of a new smithery with iron framework and corrugated iron sides and roof, to replace present building No. 9, the walls of which are cracked and in a dangerous condition.
2. New ship-fitter's shop to be erected in the vacant lot adjacent to timber basin.
3. Building No. 42, at present occupied as machine shop, to be rearranged for foundry and plumber's shop.
4. The erection of additional urinals and water-closets in close proximity to the different shops and building slips, for the greater convenience of the workmen, and in order to prevent the great loss of time which now occurs on account of their insufficient number and inconvenient location.

Navy-yard, Mare Island, Cal.:

1. Iron or steel shed for bending slabs, furnaces, etc.
2. Ship-fitter's shed, iron or steel, for punches, shears, etc.
3. Brick or stone buildings for the proper storage of lumber.
4. Standard gauge railway in connection with ferry slip so that freight cars can be run directly to the shops.

On account of the great danger from fire, and in order that the Department may benefit by the recent unfortunate accident at the navy-yard, New York, I would most urgently recommend that all future buildings for the installation of valuable machine tools, and especially those in which open fires are to be used, should be made of substantial non-inflammable material, and that the present temporary wooden structures be replaced by substantial fireproof buildings as soon as practicable.

In submitting the following estimates for the improvement of the yard plants under cognizance of this Bureau, only such amounts are asked for as seem necessary for present needs; but the Bureau desires to call the attention of the Department to the necessity of a general increase in the extent of the machine shops in order that the work may be carried on in the most economical and expeditious manner.

An appropriation of \$25,000 is recommended for the navy-yard, Portsmouth, N. H., for the purchase and erection of new tools, consisting principally of an electric drilling plant for repair work and machine tools for the ship-fitter's shop.

An appropriation of \$30,000 is recommended for the navy-yard, Boston, Mass., for the purchase and erection of new tools, consisting prin-

cipally of an electric drilling plant for repair work and machine tools for the ship-fitter's shop.

An appropriation of \$100,000 is recommended for the navy-yard, New York, for the purchase and erection of new tools, including machine tools for the different shops, wharf cranes, locomotive cranes, cars, new plate and angle furnace and brass furnaces, hydraulic plate-bending machine, pneumatic system for cranes, capstans and calking tools.

An appropriation of \$45,000 is recommended for the navy-yard League Island, for the purchase and erection of new machine tools, fitting out new boat and plumber's shops, erecting angle and plate furnaces, bending slabs, etc.

An appropriation of \$120,000 is recommended for the navy-yard, Norfolk, for the purchase and erection of new machine tools, locomotive traveling crane and floating derrick.

An appropriation of \$140,000 is recommended for the navy-yard, Mare Island, for the purchase and erection of new machine tools, bending slabs, angle and plate furnaces, hydraulic keel-plate bender, electric motor plant for portable drills, etc.

#### PROGRESSIVE SPEED TRIALS.

The Bureau begs to renew its former recommendation that all new ships of the Navy should be subject to progressive speed trials covering as great a range of speeds as possible, the trials to take place as soon as practicable after the acceptance of the vessel by the Government.

The speed curves thus obtained should be supplemented by turning trials whenever practicable.

The information obtained from experiments of this kind is invaluable to the designer and is of great practical utility in determining the maneuvering qualities of a ship under different conditions of speed and helm.

#### EXPERIMENTAL TANK.

The Bureau renews its recommendation as to the advisability of constructing an experimental tank for determining the resistance of new ships by means of models, and obtaining more accurate data as to the efficiency of different types of engines and propellers, and checking and explaining discrepancies in trials of ships already built.

The utility of these tanks is now generally recognized, and all the leading naval powers either possess them or have taken the preliminary steps toward their construction.

In my report of last year I quoted the opinion of one of the most successful Scottish shipbuilders in reference to this subject, and the fact that this private firm continues to make annually a large outlay for the purpose of continuing the experimental work of the tank is sufficient evidence of its practical utility and commercial economy, aside from the large amount of scientific data to be derived from its use.

The establishment of an experimental tank would not only benefit the naval service, but would greatly promote the shipbuilding interests of the country at large by furnishing reliable information as to the future performance of proposed types of ships.

I therefore beg to renew my recommendation that Congress be asked to appropriate \$85,000 for the construction of an experimental tank and the purchase and installation of all necessary apparatus connected therewith.

## CARPENTERS IN THE NAVY.

I desire to call the attention of the Department to the great reduction which has taken place in the number of Carpenters during the past six years. In 1886 there were fifty-one on the Navy Register. Since that date eleven vacancies have occurred and only three appointments have been made to fill these vacancies.

The demand for the services of these officers is greater now than it was in 1886, and this demand is constantly increasing with the growth of the service.

The duties of the Carpenter on a modern steel vessel are even more important than formerly in wooden ships. Upon them devolves in great measure the efficiency of the pumping system of the vessel and the integrity of its water-tight subdivisions, valves, etc.

On shore duty Carpenters are valuable assistants in the construction department of navy-yards and at private ship building yards where naval vessels are being built.

At the present time one of these officers is urgently needed at each of the following establishments, viz: The Union Iron Works, San Francisco, Cal.; the Columbian Iron Works, Baltimore, Md.; the Samuel L. Moore and Sons Co., Elizabeth, N. J.; the Bath Iron Works, Bath, Me.; and the Iowa Iron Works, Dubuque, Iowa; but their limited number and the demand for Carpenters on cruising vessels prevent any assignment to these shore stations.

In view of the above facts and the constantly increasing demand for the services of these officers, as new ships are put in commission, I most urgently recommend that appointments be made to fill the eight vacancies now existing and that the minimum number be reestablished at fifty-one, the number on the Navy Register in 1886.

In this connection I beg to call attention to the fact that by age limitation alone retirements among Carpenters will take place as follows: Two in 1894, one in 1896, two in 1897, five in 1898, so that from retirement for age alone the number will be reduced by ten within the next six years without taking into consideration retirements from other causes which numbered seven during the past six years.

In conclusion the Bureau desires to urge upon the Department the necessity of continuing the recent liberal policy of thoroughly equipping the various navy-yards for all kinds of building and repair work.

While it may be for the best interests of the country to give to private firms the greater part of the work of building new vessels, it is necessary for reasons of efficiency and economy that the work of repair be done in Government yards. The quantity and variety of this work in a modern steel war vessel necessitates the use of the most improved machine tools and the services of skillful mechanics.

Moreover, in the event of emergencies, the navy yards should be in a condition to undertake building operations of the greatest magnitude in order that the Department may not be wholly dependent upon private establishments.

This result can only be accomplished by continuing the Department's policy of improving the shipbuilding plants and training a force of skillful mechanics capable of doing the intricate and difficult work necessary in the construction and repair of modern ships of war.

I am, sir, very respectfully,

THEODORE D. WILSON,

*Chief Constructor, U. S. Navy, Chief of Bureau.*

Hon. B. F. TRACY,

*Secretary of the Navy.*



## ESTIMATES, BUREAU OF CONSTRUCTION AND REPAIR.

*Estimates of appropriations required for the fiscal year ending June 30, 1894, by the Bureau of Construction and Repair, Navy Department.*

Detailed objects of expenditures and explanations.	Estimated amount required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for current fiscal year ending June 30, 1893.
<b>A. Salaries.</b>			
Chief Clerk (appropriated July 19, 1892).....	\$1,800.00		
One draftsman (appropriated July 19, 1892).....	1,800.00		
One assistant draftsman (appropriated July 19, 1892).....	1,800.00		
One assistant draftsman (appropriated July 19, 1892).....	1,400.00		
One clerk of Class 4 (appropriated July 19, 1892).....	1,800.00		
One clerk of Class 3 (appropriated July 19, 1892).....	1,800.00		
One clerk of Class 2 (appropriated July 19, 1892).....	1,400.00		
One clerk of Class 1 (appropriated July 19, 1892).....	1,200.00		
One assistant messenger.....	720.00		
One laborer.....	660.00		
		\$13,980.00	\$13,980.00
<b>B. Construction and repair of vessels.</b>			
For preservation and completion of vessels on the stocks and in ordinary; purchase of materials and stores of all kinds; steam steerers, pneumatic steerers; steam capstans; steam windlasses and other steam auxiliaries; labor in navy-yards and on foreign stations; purchase of machinery and tools for use in shops; wear, tear, and repair of vessels afloat; general care, increase and protection of the Navy in the line of construction and repair; incidental expenses, such as advertising, freight, foreign postage, telegrams, telephone service, photographing, books, professional magazines, plans, stationery and instruments for drafting room (appropriated).....	1,000,000.00		950,000.00
<b>C. Civil establishment.</b>			
At navy-yard, Portsmouth, N. H.:			
One clerk to naval constructor (appropriated).....	1,400.00		
Two writers, at \$1,017.25 each (appropriated).....	2,034.50		
At navy-yard, Boston, Mass.:			
One clerk to naval constructor (appropriated).....	1,400.00		
At navy-yard, Brooklyn, N. Y.:			
One clerk to naval constructor (appropriated).....	1,400.00		
Three writers, at \$1,017.25 each (appropriated).....	3,051.75		
At navy-yard, League Island, Pa.:			
One clerk to naval constructor (appropriated).....	1,400.00		
At navy-yard, Washington, D. C.:			
One clerk to naval constructor (appropriated).....	1,400.00		
At navy-yard, Norfolk, Va.:			
One clerk to naval constructor (appropriated).....	1,400.00		
Two writers, at \$1,017.25 each (appropriated).....	2,034.50		
At navy-yard, Pensacola, Fla.:			
One writer (appropriated).....	1,017.25		
At navy-yard, Mare Island, Cal.:			
One clerk to naval constructor (appropriated).....	1,400.00		
Two writers, at \$1,017.25 each (appropriated).....	2,034.50		
		19,972.50	19,972.50
<b>D. Increase of the Navy—Construction and machinery.</b>			
NAVY DEPARTMENT. BUREAU OF CONSTRUCTION AND REPAIR. <i>Washington, D. C., September 5, 1892.</i>			
SIR: We have the honor to submit the following joint estimates of the amounts required by the Bureau of Construction and Repair and Steam Engineering, under appropriation "Increase of the Navy, Construction and Machinery," for work on new vessels authorized by Congress, to June 30, 1894, as per statements in detail herewith, viz:			
Under Bureau Construction and Repair:			
For fiscal year 1892-'93..	\$6,746,278.00		
For fiscal year 1893-'94..	4,916,847.00		
Total.....	\$11,663,125.00		
Under Bureau of Steam Engineering:			
For fiscal year 1892-'93..	\$3,631,373.00		
For fiscal year 1893-'94..	2,482,333.00		
Total.....	6,313,706.00		

*Estimates of appropriations required for the fiscal year ending June 30, 1894, by the Bureau of Construction and Repair, Navy Department—Continued.*

Detailed objects of expenditures and explanations.	Estimated amount required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for current fiscal year ending June 30, 1893.
<b>D. Increase of the Navy—Construction and machinery—Continued.</b>			
Balance in Treasury July 1, 1892 .....	\$4, 471, 320. 12		
Appropriation last Congress .....	7, 000, 000. 00		
Total .....	11, 471, 320. 12		
Less amounts required to pay the following reservations, etc., due and not paid July 1, 1892, under Bureaus of Construction and Repair, Steam Engineering, and Equipment:			
Reservation, Philadelphia .....	\$25, 000. 00		
Reservation, Newark .....	42, 485. 00		
Extra work, Newark .....	2, 200. 00		
Reservation, Concord, less decreased cost, changes .....	14, 991. 92		
Reservation, Bennington, less decreased cost, changes .....	13, 740. 17		
Pneumatic system, Terror .....	11, 484. 00		
Electric lighting plants, Montonomah, Monadnock, Terror .....	8, 095. 47		
	117, 996. 56		
Available balance in Treasury .....	\$11, 353, 323. 56		
Appropriation required for 1893-'94 .....	6, 623, 507. 44		
This amount, \$6,623,507.44, is the estimated amount required to be appropriated for work on new vessels authorized by Congress for "increase of the Navy, construction, and machinery," for the fiscal year ending June 30, 1894.			
Very respectfully,			
DARIUS A. GREEN,			
Acting Chief of Bureau of Construction and Repair.			
GEO. W. MELVILLE,			
Engineer-in-Chief,			
Chief of Bureau of Steam Engineering.			
Hon. B. F. TRACY, Secretary of the Navy.			

*E. Vessels repaired at the different navy-yards during the fiscal year 1891-'92.*

Emerald.	Vermont.	Minnesota.	Comanche.
Galeus.	Boston.	Dolphin.	Independence.
Fern.	Thetis.	Franklin.	Baltimore.
Constitution.	Yorktown.	Mayflower.	Ranger.
Leyden.	Yantic.	Speedwell.	Charleston.
Monongahela.	Dispatch.	San Francisco.	Marion.
Kearsarge.	Vesuvius.	Portsmouth.	Mohican.
Newark.	Philadelphia.	Jamestown.	Nipaw.
Bennington.	Petrel.	Passaic.	Nina.
Concord.	Chicago.	Constellation.	
Catalpa.	Atlanta.	Adams.	
Fortune.	Nantucket.	Alert.	

## APPENDIX F.—Table of

## ARMORED

Name.	Type.	Keel laid.	By whom and where built or building.	Condition or service.	Dimensions.			Displacement.	Maximum indicated horse power.
					Length on load water line.	Breadth.	Main draft.		
Puritan.....	Iron low free-board coast-defense monitor. Two steel barbette turrets.	1875	John Roach, Chester, Pa.	In course of completion at U. S. navy-yard, New York.	<i>Ft.</i> 289 6	<i>In.</i> 60 1½	<i>Ft.</i> 18 0	<i>Tons.</i> 6,060	3,700
Miantonomoh.	Iron low free-board coast-defense monitor. Two compound armorturrets.	1874	.....do .....	North Atlantic station.	259 6	55 10	14 6	3,990	1,426
Amphitrite...	Iron low free-board coast-defense monitor. Two steel barbette turrets.	1874	Harlan & Hollingsworth, Wilmington, Del.	In course of completion at U. S. navy-yard, Norfolk, Va.	259 6	55 10	14 6	3,990	1,600
Monadnock....	.....do .....	1874	U. S. navy-yard, Mare Island, Cal.	In course of completion.	259 6	55 10	14 6	3,990	3,000
Terror.....	Iron low free-board coast-defense monitor. Two steel turrets.	1874	Wm. Cramp & Sons, Philadelphia, Pa.	In course of completion at U. S. navy-yard, New York.	259 6	55 10	14 6	3,990	1,600
Texas .....	Steel armored battle ship. Two steel turrets.	1889	U. S. navy-yard, Norfolk, Va.	Building..	301 4	64 1	22 6	6,300	8,000
Maine .....	Steel armored cruiser. Two steel barbette turrets.	1888	U. S. navy-yard, Brooklyn, N. Y.	.....do .....	318 0	57 0	21 6	6,648	9,000
Monterey.....	Steel low free-board coast defense. Two steel barbette turrets.	1889	Union Iron Works, San Francisco, Cal.	.....do .....	256 0	59 0	14 10	4,138	5,400
New York ....	Steel armored cruiser. Two steel barbette turrets.	1890	Wm. Cramp & Sons, Philadelphia, Pa.	.....do .....	389 6½	64 10	23 ¾	8,150	16,500
No. 1.....	Steel harbor-defense ram.	1891	Bath Iron Works, Bath, Me.	.....do .....	250 9	43 5	15 0	2,183	4,800
Massachusetts	Steel coast-line battle ship. 2 13" barbette turrets. 4 3" barbette turrets.	1891	Wm. Cramp & Sons, Philadelphia, Pa.	.....do .....	348 0	69 3	24 0	10,200	9,000
Indiana.....	.....do .....	1891	.....do .....	.....do .....	348 0	69 3	24 0	10,200	9,000
Oregon .....	.....do .....	1891	Union Iron Works, San Francisco, Cal.	.....do .....	348 0	69 3	24 0	10,200	9,000

\* Limit.

## vessels of the U. S. Navy.

## VESSELS.

Type of engine.	Speed in knots per hour.	Batteries.		Sides.	Armor.		Cost of hull and machinery.	Date of act authorizing building or completion.
		Main.	Secondary.		Turrets.	Barbettes.		
Twin screw horizontal compound.	12.4	4 12" B. L. R. 6 4" R. F. guns.	2 6-pdr. R. F. .. 4 3-pdr. R. F. .. 4 37 <sup>mm</sup> H. R. C. 4 Gatlings.	Ins. 14	Inches. 8	Inches. 14	Appropriation to complete, \$3,178,046.	Mar. 3, 1885; Aug. 3, 1886; Mar. 3, 1887.
Twin screw inclined compound.	10.5	4 10" B. L. R.	2 6-pdr. R. F. .. 2 3-pdr. R. F. .. 2 37 <sup>mm</sup> H. R. C. 2 Gatlings.	7	11½	.....		Do.
...do .....	12	4 10" B. L. R. 2 4" R. F. guns.	2 6-pdr. R. F. .. 2 3-pdr. R. F. .. 2 37 <sup>mm</sup> H. R. C. 2 Gatlings.	9	7½	11½		Do.
Twin screw horizontal triple expansion.	14.5	4 10" B. L. R. 2 4" R. F. guns.	2 6-pdr. R. F. .. 2 3-pdr. R. F. .. 2 37 <sup>mm</sup> H. R. C. 2 Gatling.	9	7½	11½		Do.
Twin screw inclined compound.	12	4 10" B. L. R.	2 6-pdr. R. F. .. 2 3-pdr. R. F. .. 2 37 <sup>mm</sup> H. R. C. 2 Gatlings.	7	11½	.....		Do.
Twin screw vertical triple expansion.	17	2 12" B. L. R. 6 6" B. L. R.	12 6-pdr. R. F. .. 4 1-pdr. R. F. .. 4 37 <sup>mm</sup> H. R. C. 2 Gatlings.	12	12	.....	*2,500,000	Aug. 3, 1886.
...do .....	17	4 10" B. L. R. 6 6" B. L. R.	12 6-pdr. R. F. .. 6 1-pdr. R. F. .. 4 Gatlings.	12	8	12	*2,500,000	Mar. 3, 1887.
...do .....	16	2 12" B. L. R. 2 10" B. L. R.	6 6-pdr. R. F. .. 4 1-pdr. R. F. .. 2 Gatlings.	13	For'd 8" Aft 7½"	For'd 14" Aft 11½"	†1,628,950	Mar. 3, 1887.
...do .....	20	6 8" B. L. R. 12 4" R. F. guns.	8 6-pdr. R. F. .. 4 1-pdr. R. F. .. 4 Gatlings.	4	5½	10	†2,985,000	Sept. 7, 1888.
...do .....	17	.....	4 6-pdr. R. F. ..	6	.....	.....	†930,000	Mar. 2, 1889.
...do .....	15	4 13" B. L. R. 8 8" B. L. R. 4 6" B. L. R.	20 6-pdr. R. F. .. 4 6-pdr. R. F. .. 4 Gatlings.	18	15 6 6	17 8 6	†3,020,000	June 30, 1890.
...do .....	15	4 13" B. L. R. 8 8" B. L. R. 4 6" B. L. R.	20 6-pdr. R. F. .. 4 1-pdr. R. F. .. 4 Gatlings.	18	do	do	†3,020,000	Do.
...do .....	15	4 13" B. L. R. 8 8" B. L. R. 4 6" B. L. R.	20 6-pdr. R. F. .. 4 1-pdr. R. F. .. 4 Gatlings.	18	do	do	†3,180,000	Do.

† Contract price.

APPENDIX F.—*Table of vessels*

## SINGLE TURRET

Name.	Type.	Keel laid.	By whom and where built.	Condition.	Dimensions.			Displacement.	Indicated horse power.
					Length between perpendiculars.	Breadth.	Mean draft.		
Ajax .....	Low free board single-turret monitor.	1862	Snowden & Mason, Pittsburg, Pa.	In ordinary, near Richmond.	<i>Feet.</i> 225	<i>Ft.In.</i> 43 8	<i>Ft.In.</i> 13 6	<i>Tons.</i> 2,100	340
Comanche .....	do .....	1862	Donohue, Ryan & Secor, Jersey City, N. J.	In ordinary, Mare Island, Cal.	200	46 0	11 6	1,875	340
Canonicus .....	do .....	1862	Harrison Loring, Boston, Mass.	In ordinary, near Richmond.	225	43 8	13 6	2,100	340
Catskill .....	do .....	1862	John Ericsson, Brooklyn, N. Y.	do .....	200	46 0	11 6	1,875	340
Jason .....	do .....	1862	John Ericsson, Chester, Pa.	In ordinary, League Island, Pa.	200	46 0	11 6	1,875	340
Lehigh .....	do .....	1862	do .....	In ordinary, near Richmond.	200	46 0	11 6	1,875	340
Mahopac .....	do .....	1862	Z. and F. Secor, Jersey City, N. J.	do .....	225	43 8	13 6	2,100	340
Mahattan .....	do .....	1862	Perine, Secor & Co., Jersey City, N. J.	do .....	225	43 8	13 6	2,100	340
Montank .....	do .....	1862	John Ericsson, Brooklyn, N. Y.	In ordinary, League Island, Pa.	200	46 0	11 6	1,875	340
Nahant .....	do .....	1862	Harrison Loring, Boston, Mass.	do .....	200	46 0	11 6	1,875	340
Nantucket .....	do .....	1862	Atlantic Works, Boston, Mass.	In ordinary, New York.	200	46 0	11 6	1,875	340
Passaic .....	do .....	1862	John Ericsson, Brooklyn, N. Y.	In ordinary, Boston, Mass.	200	46 0	11 6	1,875	340
Wyandotte .....	do .....	1862	Miles Greenwood, Cincinnati, Ohio.	In ordinary, near Richmond.	225	43 8	13 6	2,100	340

*of the U. S. Navy—Continued.*

## MONITORS (IRON).

Type of engine.	Speed in knots.	Batteries.		Armor.		Cost of hull and machinery.	Date of act authorizing building.
		Main.	Secondary.	Sides.	Turret.		
Single-screw grasshopper.	5 to 6	2 XV" S. B....	None .....	<i>Ins.</i> 5	<i>Ins.</i> 10	\$626,582.24	April 17, 1862.
.....do .....	5 to 6	None .....	.....do .....	5	11	613,164.98	Do.
.....do .....	6	2 XV" S. B....	212-pdr.H.	5	10	622,963.22	Do.
.....do .....	6	.....do .....	None .....	5	11	427,766.78	Do.
.....do .....	5 to 6	.....do .....	.....do .....	5	11	422,766.73	Do.
.....do .....	5 to 6	.....do .....	.....do .....	5	11	422,726.28	Do.
.....do .....	6	.....do .....	.....do .....	5	10	635,374.55	Do.
.....do .....	6	.....do .....	.....do .....	5	10	628,879.27	Do.
.....do .....	5 to 6	.....do .....	.....do .....	5	11	423,027.49	Do.
.....do .....	5 to 6	.....do .....	.....do .....	5	11	413,515.14	Do.
.....do .....	5 to 7	.....do .....	.....do .....	5	11	408,091.37	Do.
.....do .....	5 to 6	.....do .....	112-pdr.H.	5	11	423,171.09	Do.
.....do .....	6	.....do .....	.....do .....	5	10	633,327.84	Do.

## APPENDIX F.—Table of vessels

## UNARMORED

Name.	Type.	Keel laid.	By whom and where built or building.	Condition or service	Dimensions.			Displacement.	Maximum indicated horse-power.
					Length on load-water line.	Extreme breadth.	Mean draft.		
Chicago.....	Protected cruiser.	1883	John Roach & Sons, Chester, Pa.	Flagship North Atlantic station.	<i>Ft.</i> 325 0	<i>Ft.</i> 48 2	<i>Ft.</i> 19 0	<i>Tons.</i> 4,500	5,084
Boston.....	do	1883	do	Special service squadron.	270 3	42 0	17 0	3,189	4,030
Atlanta.....	do	1883	do	North Atlantic station.	270 3	42 0	17 0	3,189	4,030
Dolphin.....	Dispatch boat.	1883	do	Special service.	240 0	32 0	14 3	1,485	2,240
Newark.....	Protected cruiser.	1887	Wm. Cramp & Sons, Philadelphia, Pa.	Flagship, South Atlantic station.	310 0	49 2	18 9	4,083	8,869
Charleston.....	do	1887	Union Iron Works, San Francisco, Cal.	Special service squadron.	312 0	46 0	19 7	4,040	6,666
Baltimore.....	do	1887	Wm. Cramp & Sons, Philadelphia, Pa.	do	327 6	48 6	20 6	4,600	10,064
San Francisco.....	do	1888	Union Iron Works, San Francisco, Cal.	Flagship special service squadron.	310 0	49 2	18 9	4,083	10,400
Philadelphia.....	do	1888	Wm. Cramp & Sons, Philadelphia, Pa.	North Atlantic station.	327 6	48 6	19 2½	4,324	8,815
Olympia.....	do	1890	Union Iron Works, San Francisco, Cal.	Building.....	340 0	53 0	21 6	5,500	13,500
Cincinnati.....	do	1890	U. S. navy-yard, Brooklyn, N. Y.	do	300 0	42 0	18 0	3,183	10,000
Raleigh.....	do	1889	U. S. navy-yard, Norfolk, Va.	do	300 0	42 0	18 0	3,183	10,000
Montgomery.....	Cruiser	1890	Columbian Iron Works, Baltimore, Md.	do	257 0	37 0	14 6	2,000	5,400
Detroit.....	do	1890	do	do	257 0	37 0	14 6	2,000	5,400
Marblehead.....	do	1890	City Point Works, Boston, Mass.	do	257 0	37 0	14 6	2,000	5,400

\* Contract price.

of the U. S. Navy—Continued.

## STEEL VESSELS.

Type of engine.	Speed in knots per hour.	Batteries.		Cost of hull and machinery.	Date of act authorizing the building.	Contract signed.	Time to complete from date of contract.
		Main.	Secondary.				
Twin screw compound overhead beam.	15.33	4 8" B. L. R. 8 6" B. L. R. 2 5" B. L. R.	2 6-pdr. R. F. 2 1-pdr. R. F. 4 47 <sup>mm</sup> H. R. C. 2 37 <sup>mm</sup> H. R. C. 2 Gatlings.	*\$89,000	Mar. 3, 1883	July 26, 1883	Mos. .....
Single screw horizontal compound.	15.00	6 6" B. L. R. 2 8" B. L. R.	2 6-pdr. R. F. 2 3-pdr. R. F. 2 1-pdr. R. F. 4 47 <sup>mm</sup> H. R. C. 2 37 <sup>mm</sup> H. R. C. 2 Gatlings.	*619,000	.....do	.....do	.....
.....do	15.60	6 6" B. L. R. 2 8" B. L. R.	2 6-pdr. R. F. 2 3-pdr. R. F. 2 1-pdr. R. F. 4 47 <sup>mm</sup> H. R. C. 2 37 <sup>mm</sup> H. R. C. 2 Gatlings.	*617,000	.....do	.....do	.....
Single screw vertical compound.	15.50	2 4" R. F. guns	2 6-pdr. R. F. 4 47 <sup>mm</sup> H. R. C. 2 Gatlings.	*315,000	.....do	.....do	.....
Twin screw horizontal triple expansion.	19.00	12 6" B. L. R.	4 6-pdr. R. F. 4 3-pdr. R. F. 2 1-pdr. R. F. 3 37 <sup>mm</sup> H. R. C. 4 Gatlings.	*1,248,000	Mar. 3, 1885	Oct. 27, 1887	21
Twin screw horizontal compound.	18.20	2 8" B. L. R. 6 6" B. L. R.	4 6-pdr. R. F. 2 3-pdr. R. F. 2 1-pdr. R. F. 4 37 <sup>mm</sup> H. R. C. 2 Gatlings.	*1,017,000	.....do	Dec. 28, 1886	18
Twin screw horizontal triple expansion.	19.575	4 8" B. L. R. 6 6" B. L. R.	4 6-pdr. R. F. 2 3-pdr. R. F. 2 1-pdr. R. F. 4 37 <sup>mm</sup> H. R. C. 2 Gatlings.	*1,325,000	Aug. 3, 1886	Dec. 17, 1886	18
.....do	20.17	12 6" B. L. R.	4 6-pdr. R. F. 4 3-pdr. R. F. 2 1-pdr. R. F. 3 37 <sup>mm</sup> H. R. C. 4 Gatlings.	*1,428,000	Mar. 3, 1887	Oct. 26, 1887	24
.....do	19.678	12 6" B. L. R.	4 6-pdr. R. F. 4 3-pdr. R. F. 2 1-pdr. R. F. 3 37 <sup>mm</sup> H. R. C. 4 Gatlings.	*1,325,000	.....do	Oct. 27, 1887	24
Twin screw vertical triple expansion.	20.00	10 5" R. F. guns 4 8" B. L. R.	14 6-pdr. R. F. 6 1-pdr. R. F. 4 Gatlings.	*1,796,000	Sept. 7, 1888	July 10, 1890	April 1, 1893
.....do	19.00	10 5" R. F. guns 1 6" R. F. guns	8 6-pdr. R. F. 4 1-pdr. R. F. 2 Gatlings.	†1,100,000	.....do	.....	.....
.....do	19.00	10 5" R. F. guns 1 6" R. F. guns	8 6-pdr. R. F. 4 1-pdr. R. F. 2 Gatlings.	†1,100,000	.....do	.....	.....
.....do	17.00	8 5" R. F. guns 2 6" R. F. guns	6 6-pdr. R. F. 2 1-pdr. R. F. 2 Gatlings.	*612,500	.....do	Nov. 2, 1889	30
.....do	17.00	8 5" R. F. guns 8 5" R. F. guns	6 6-pdr. R. F. 2 1-pdr. R. F. 2 Gatlings.	*612,500	.....do	.....do	30
.....do	17.00	8 5" R. F. guns 8 5" R. F. guns	6 6-pdr. R. F. 2 1-pdr. R. F. 2 Gatlings.	*674,000	.....do	Nov. 11, 1889	30

† Limit.



## APPENDIX F.—Table of vessels

## UNARMORED STEEL.

Name.	Type.	Keel laid.	By whom and where built or building.	Condition or service.	Dimensions.			Displacement.	Maximum indicated horse power.
					Length on load-water line.	Breadth.	Mean draft.		
Columbia .....	Protected cruiser.	1890	Wm. Cramp & Sons, Philadelphia, Pa.	Building.....	<i>Ft. In.</i> 412 0	<i>Ft. In.</i> 58 0	<i>Ft. In.</i> 22 6½	<i>Tons.</i> 7,350	21,000
Cruiser No. 13. ....	do .....	.....	do .....	do .....	412 0	58 0	22 6½	7,350	21,000
GUNBOATS.									
Yorktown .....	Gunboat..	1887	do .....	Special service squadron.	230 0	36 0	14 0	1,700	3,660
Concord .....	do .....	1888	N. F. Palmer & Co., Chester, Pa.	North Atlantic station.	230 0	36 0	14 0	1,700	3,405
Bennington.....	do .....	1888	do .....	South Atlantic station.	230 0	36 0	14 0	1,700	3,436
Petrel .....	do .....	1887	Columbian Iron Works, Baltimore, Md.	Asiatic station.	176 3	31 0	11 7	890	1,513
Machias .....	do .....	1891	Bath Iron Works, Bath, Me.	Building.....	190 0	32 0	12 0	1,050	1,600
Castine .....	do .....	1891	do .....	do .....	190 0	32 0	12 0	1,050	1,600
SPECIAL CLASS.									
Practice cruiser.	For naval cadets.	1891	Moore & Sons, Elizabethport, N. J.	Building.....	187 6	32 0	11 6	838	1,300
Vesuvius .....	Dynamite cruiser.	1887	Wm. Cramp & Sons, Philadelphia, Pa.	North Atlantic station.	251 9	26 5	10 7½	930	3,794.86
Dyn a m i t e cruiser No. 2.	.....	.....	.....	Subject to orders from the Department.	.....	.....	.....	.....	.....
Torpedo cruiser	.....	.....	.....	do .....	.....	.....	.....	.....	.....
TORPEDO BOATS.									
Stiletto .....	Wood torpedo boat.	.....	Purchased from Herreshoff M'fg Co.	Torpedo practice, Newport, R. I.	88 6	11 0	3 0	31	359
Cushing .....	Steel torpedo boat.	1889	Herreshoff M'fg Co., Bristol, R. I.	Special service.	138 9	14 10	5 3	118	1,720
Torpedo boat No. 2	do .....	.....	Iowa Iron Works, Dubuque, Iowa.	Building.....	150 0	15 6	4 9	120	1,800

\* Contract price.

of the U. S. Navy—Continued.

VESSELS—Continued.

Type of engine.	Speed in knots per hour.	Batteries.		Cost of hull and machinery.	Date of act authorizing the building.	Contract signed.	Time to complete from date of contract.
		Main.	Secondary.				
Triple screw vertical triple expansion.	21	18" B. L. R. . . 26" R. F. guns 84" R. F. guns	126-pdr. R. F. . . 41-pdr. R. F. . . 4 Gatlings.	\$2,725,000	June 30, 1890	Nov. 19, 1890	Mos. 30
...do .....	21	18" B. L. R. . . 26" R. F. guns 84" R. F. guns	126-pdr. R. F. . . 41-pdr. R. F. . . 4 Gatlings.	*2,000,000	Mar. 2, 1891	Aug. 31, 1891	24
Twin screw horizontal triple expansion.	16.65	66" B. L. R. . .	26-pdr. R. F. . . 23-pdr. R. F. . . 11-pdr. R. F. . . 237" H. R. C. 2 Gatlings.	*455,000	Mar. 3, 1885	Jan. 31, 1887	12
...do .....	16.8	66" B. L. R. . .	26-pdr. R. F. . . 23-pdr. R. F. . . 11-pdr. R. F. . . 237" H. R. C. 2 Gatlings.	*490,000	Mar. 3, 1887	Nov. 15, 1887	18
...do .....	17.5	66" B. L. R. . .	26-pdr. R. F. . . 23-pdr. R. F. . . 11-pdr. R. F. . . 237" H. R. C. 2 Gatlings.	*490,000	...do .....	...do .....	18
Single screw horizontal compound.	11.53	46" B. L. R. . .	23-pdr. R. F. . . 11-pdr. R. F. . . 237" H. R. C. 2 Gatlings.	*247,000	Mar. 3, 1885	Dec. 22, 1886	12
Twin screw vertical triple expansion.	14	84" R. F. guns	46-pdr. R. F. . . 21-pdr. R. F. . . 2 Gatlings.	*318,000	Mar. 2, 1887	Apr. 12, 1890	24
...do .....	14	84" R. F. guns	46-pdr. R. F. . . 21-pdr. R. F. . . 2 Gatlings.	*318,000	...do .....	...do .....	24
Twin screw vertical triple expansion.	13	44" R. F. guns	36-pdr. R. F. . . 22-pdr. R. F. . . 11-pdr. R. F. . . 137" H. R. C. 1 Gatling.	*250,000	Sept. 7, 1888	July 18, 1890	24
Twin screw vertical triple expansion.	22.5	3 dynamite guns, 15" cal.	33-pdr. R. F. . .	*350,000	Aug. 3, 1886	Feb. 11, 1887	12
Single screw vertical.	18.22	None .....	None .....	†25,000	...	...	...
Twin screw vertical quadruple expansion.	22.5	3 torpedo tubes.	31-pdr. R. F. . .	*82,750	Mar. 3, 1887	Mar. 1, 1888	15
...do .....	22.4	3 18" White-head torpedo tubes.	41-pdr. R. F. . .	*113,500	June 30, 1890	...	12

†Limit.

APPENDIX F.—*Tables of vessels*

## IRON AND WOODEN

Name.	Built.			Condition or service.	Rig.
	When.	Where.	By whom..		
IRON.					
Ranger .....	1873-1876	Wilmington, Del.	Harlan & Hollingsworth.	Pacific station .....	Bark .....
Alert .....	1873-1875	Chester, Pa. ....	John Roach .....	Asiatic station .....	do .....
Monocacy ....	1863	Baltimore, Md. ...	A. & W. Denmead & Son.	do .....	Schooner...
Michigan .....	1844	Erie, Pa. ....	United States .....	Special service North-western lakes.	Barkentine
Palos .....	1865	Boston, Mass. ....	James Tetlow .....	Asiatic station .....	Schooner ..
Pinta .....	1865	Chester, Pa. ....	Reany, Son & Archbold.	Special service .....	do .....
Alarm .....	1874	New York, N. Y.	United States .....	In ordinary, at navy-yard, New York.	do .....
WOODEN.					
Lancaster ....	1858	Philadelphia, Pa.	United States .....	Flag ship, Asiatic station.	Ship .....
Pensacola ....	1858-1862	Pensacola, Fla. ...	do .....	In ordinary, at navy-yard, Mare Island.	do .....
Richmond ....	1858	Norfolk, Va. ....	do .....	Training squadron .....	do .....
Omaha .....	1867-1869	Philadelphia, Pa.	do .....	In ordinary, at navy-yard, Mare Island.	Bark .....
Swatara .....	1872	New York, N. Y.	do .....	do .....	Ship .....
Marion .....	1871-1875	Kittery .....	do .....	Asiatic station .....	Bark .....
Mohican .....	1872-1883	Mare Island .....	do .....	Pacific station .....	do .....
Iroquois .....	1858	New York .....	do .....	In ordinary, at navy-yard, Mare Island.	Ship .....
Kearsarge ....	1861	Kittery .....	do .....	North Atlantic station.	Bark .....
Adams .....	1874-1876	Boston .....	United States and Donald McKay.	Pacific station .....	do .....
Alliance .....	1873-1876	Norfolk .....	United States .....	Asiatic station .....	do .....
Essex .....	1874-1876	Kittery and Boston.	United States and Donald McKay.	South Atlantic station.	do .....
Enterprise ....	1873-1876	Kittery .....	John W. Griffith and United States.	Nautical schoolship, Boston, Mass.	do .....
Nipsic .....	1873-1879	Washington .....	United States .....	Navy station, Puget Sound.	do .....

\*Anthracite.

of the U. S. Navy—Continued.

## STEAM VESSELS.

Dimensions.			Displacement.	Indicated horse power.	Speed in knots.	Batteries.		Coal capacity.	Comple- ment.	
Length between perpendiculars.	Breadth.	Mean draft.				Main.	Secondary.		Officers.	Men.
<i>Ft. In.</i>	<i>Ft. In.</i>	<i>Ft. In.</i>	<i>Tons.</i>					<i>Tons.</i>		
175 0	32 0	12 9	1,020	365	10	.....	Battery landed.....	*126	21	127
175 0	32 0	12 9	1,020	365	10	2 IX" S. B. ....	1 3" B. L. H. ....	*133	21	127
						1 XI" S. B. ....	1 12-pdr. S. B. howtz.			
						1 60-pdr. B. L. R. ....				
255 0	35 0	9 0	1,370	850	11.2	4 VIII" S. B. ....	1 3" B. L. R. ....	1224	12	114
						2 60-pdr. B. L. R. ....	1 12-pdr. S. B. howtz.			
							6 H. R. C. ....			
							1 Gatling. ....			
163 3	27 1½	9 0	685	305	10.5	4 30-pdr. B. L. R. ....	3 3" B. L. H. ....	*135		
							2 Gatlings. ....			
137 0	26 0	9 9	420	246	10.35	4 24-pdr. S. B. howtz.	1 12-pdr. S. B. howtz.	*102	9	49
						2 20-pdr. R. howitzer	2 37 <sup>mm</sup> H. R. C. ....			
137 0	26 0	11 0	550	190	8.5	4 12-pdr. S. B. howtz.	1 Gatling. ....	*111	8	37
158 6	28 0	10 6	800	600	10	1 6" B. L. R. ....	2 3-pdr. R. F. ....	*405		
							1 37 <sup>mm</sup> H. R. C. ....			
235 8	46 0	19 2	3,250	733	9.6	10 8" M. L. R. ....	1 3" B. L. H. ....	1288		
							2 6-pdr. R. F. ....			
							2 1-pdr. R. F. ....			
							4 37 <sup>mm</sup> H. R. C. ....			
							1 Gatling. ....			
230 8	44 6	18 7	3,000	680	9	12 IX" S. B. ....	1 3" B. L. H. ....	*285		
						2 80-pdr. R. L. R. ....	4 37 <sup>mm</sup> H. R. C. ....			
						2 60-pdr. B. L. R. ....	1 long Gatling. ....			
						2 20-pdr. B. L. R. htz.				
225 0	42 6	17 4½	2,700	692	9.5	12 IX" S. B. ....	2 20-pdr. B. L. R. ....	1265	29	321
						1 8" M. L. R. ....	1 3" B. L. H. ....			
						1 60-pdr. B. L. R. ....	2 37 <sup>mm</sup> H. R. C. ....			
							1 Gatling. ....			
250 6	38 0	16 6	2,400	953	11.3	.....	Battery landed.....			
216 0	37 0	16 6	1,900	680	10.1	.....	do			
216 0	37 0	16 6	1,900	753	11.25	1 8" M. L. R. ....	2 20-pdr. B. L. R. ....	*135	18	176
						6 IX" S. B. ....	1 3" B. L. H. ....			
						1 60-pdr. B. L. R. ....	2 37 <sup>mm</sup> H. R. C. ....			
							1 Gatling. ....			
216 0	37 0	16 6	1,900	613	10.65	8 IX" S. B. ....	2 20-pdr. B. L. R. ....	*162	21	193
						1 8" M. L. R. ....	1 3" B. L. H. ....			
						1 60-pdr. B. L. R. ....	1 12-pdr. S. B. howtz.			
							2 37 <sup>mm</sup> H. R. C. ....			
							1 Gatling. ....			
198 10	33 10	15 3	1,575	1,202	10.7	2 8" M. L. R. ....	1 12-pdr. S. B. howtz.	*128		
						4 60-pdr. M. L. R. ....	1 3" B. L. H. ....			
						1 60-pdr. B. L. R. ....	2 Gatlings. ....			
198 6	33 0	15 9	1,550	843	11.1	4 IX" S. B. ....	1 3" B. L. H. ....	*165	21	191
						2 8" M. L. R. ....	2 20-pdr. B. L. R. ....			
						1 60-pdr. B. L. R. ....	2 Gatling. ....			
185 0	35 0	14 3	1,375	550	9.8	4 IX" S. B. ....	1 3" B. L. H. ....	*150	20	160
						1 8" M. L. R. ....	1 12-pdr. howtz.			
						1 60-pdr. M. L. R. ....	2 37 <sup>mm</sup> H. R. C. ....			
							1 Gatling. ....			
185 0	35 0	14 3	1,375	668	9.98	4 IX" S. B. ....	1 3" B. L. H. ....	*150	18	160
						1 8" M. L. R. ....	1 12-pdr. S. B. howtz.			
						1 60-pdr. M. L. R. ....	1 Gatling. ....			
185 0	35 0	14 3	1,375	505	10.4	4 IX" S. B. ....	1 3" B. L. H. ....	1130	15	170
						1 8" M. L. R. ....	1 12-pdr. S. B. howtz.			
						1 60-pdr. M. L. R. ....	1 Gatling. ....			
185 0	35 0	14 3	1,375	790	11.4	4 IX" S. B. ....	2 3" B. L. H. ....	*130		
						1 8" M. L. R. ....	1 37 <sup>mm</sup> H. R. C. ....			
						1 60-pdr. B. L. R. ....	1 Gatling. ....			
185 0	35 0	14 3	1,375	839	10.7	.....	Battery landed.....	1132		

† Bituminous.

APPENDIX F.—*Tables of vessels*

## IRON AND WOODEN

Name.	Built.			Condition or service.	Rig.
	When.	Where.	By whom.		
WOODEN.					
Yantic.....	1864	Philadelphia, Pa.	United States.....	South Atlantic station.	Bark .....
Thetis.....		Dundee, Scotland	Alex. Stevens & Sons.	Pacific station.....	do .....

\* Bituminous.

## WOODEN SAIL

Constellation ..	1854	Gosport .....	United States.....	Special service.....	Ship .....
Monongahela ..	1862	Philadelphia.....	do .....	Training squadron ..	Bark .....
Portsmouth ..	1843	Kittery .....	do .....	do .....	Ship .....
Jamestown .....	1845	Gosport.....	do .....	Hospital ship.....	do .....
Saratoga .....	1842	Kittery .....	do .....	Nautical schoolship, Philadelphia, Pa.	do .....
St. Mary's ....	1844	Washington .....	do .....	Nautical schoolship, New York.	do .....

## STEEL, IRON, AND

Name.	Built.			Material.
	When.	Where.	By whom.	
Catalpa .....	1864	.....	Purchased.....	Wood .....
Fortune.....	1865	Boston .....	John Tetlow .....	Iron .....
Leydon .....	1866	do .....	James Tetlow .....	do .....
Mayflower .....	1866	do .....	do .....	do .....
Ivy .....	1867	.....	Purchased.....	Wood .....
Nellie .....	1887	Navy yard, Mare Island, Cal.	United States.....	do .....
Nina .....	1865	Chester.....	Reany, Son & Arch- bold.	Iron .....
Rocket .....	1863	.....	Purchased.....	Wood .....
Standish .....	1865	Boston .....	James Tetlow .....	Iron .....
Triton .....	1888	Camden, N. J.	Jno. H. Dialogue.....	do .....
Iwawa .....	1891	Boston .....	City Point Iron Wks.	Steel.....
Wahnetta .....	1891	do .....	do .....	do .....
Narkeeta .....	1891	do .....	do .....	do .....

of the U. S. Navy—Continued.

## STEAM VESSELS—Continued.

Dimensions.			Displacement.	Indicated horse power.	Speed in knots.	Batteries.		Coal capacity.	Complement.	
Length between perpendiculars.	Breadth.	Mean draft.				Main.	Secondary.		Officers.	Men.
<i>Ft. In</i>	<i>Ft. In</i>	<i>Ft. In</i>	<i>Tons.</i>					<i>Tons.</i>		
180 0	30 0	12 2	900	225	8.30	2 IX" S. B.	112-pdr. S. B. howtz.	117	20	134
						1 8" M. L. R.	1 Gatling.			
106 0	30 3	18 0	1,250	490	7.55	1 60-pdr. B. L. R.	1 3" B. L. H.	300	10	98
							1 53 <sup>mm</sup> H. R. C.			
							2 Gatlings.			

## ING VESSELS.

176 0	42 0	20 0	1,180	.....	.....	10 VIII" S. B.	1 20-pdr. B. L. R.	.....	15	203
							2 12-pdr. S. B. howtz.	.....		
							1 3" B. L. H.	.....		
223 0	38 0	16 6	2,100	.....	.....	do.	1 Gatling.	.....		
							1 3" B. L. H.	.....		
153 0	38 3	16 6	1,125	.....	.....	1 VIII" S. B.	1 47-pdr. H. R. C.	.....	15	210
						1 60-pdr. B. L. R.	2 20-pdr. B. L. R.	.....		
							1 3" B. L. H.	.....		
							1 Gatling.	.....		
163 6	36 0	16 0	1,150	.....	.....	None	2 12-pdr. howitzer.	.....		
147 6	30 1	16 0	1,025	.....	.....	None		.....		
150 0	37 6	15 6	1,025	.....	.....	8 VIII" S. B.	None	.....		

## WOODEN STEAM TUGS.

Rig.	Dimensions.			Displacement.	Indicated horse power.	Speed in knots.	Coal capacity.
	Length between perpendiculars.	Breadth.	Mean draft.				
	<i>Feet. In.</i>	<i>Feet. In.</i>	<i>Feet. In.</i>	<i>Tons.</i>			<i>Tons.</i>
Schooner	137	26	9 6	450	340	10	80
do	137	26	9 6	450	340	10	80
do	137	26	9 6	450	338	10.6	80
	60	14	4	32.08	340	8.5	3.50
					40	8	
Schooner	137	26	8 6	357	340	10	80
	85 8	18 10	7	187	147	8.5	.....
Schooner	137	26	9 6	450	340	10	80
	96 9	20 9	9	212	300	13	45
	92 6	20 11 $\frac{1}{2}$	8	192.4	300	.....	35
	92 6	20 11 $\frac{1}{2}$	8	192.4	300	.....	35
	92 6	20 11 $\frac{1}{2}$	8	192.4	300	.....	35

APPENDIX F.—*Tables of vessels*

## VESSELS UNFIT

Name.	Built.			Condition or service.	Rig or type.
	When.	Where.	By whom.		
IRON (STEAM).					
Speedwell .....	1865	Boston .....	James Tetlow .....	Condemned at Norfolk	Tugboat .....
WOODEN (STEAM).					
Hartford .....	1858	Boston, Mass .....	United States .....	In ordinary, Mare Island, Cal.	Ship .....
Franklin .....	1855-'65	Kittery, Me. ....	do .....	Receiving ship, Norfolk, Va.	Housed over ..
Wabash .....	1854	Philadelphia, Pa. ....	do .....	Receiving ship, Boston, Mass.	Housed over ..
Minnesota .....	1855	Washington .....	do .....	Receiving ship for training squadron, N. Y.	do .....
SAILING.					
Constitution ..	1797	Boston, Mass .....	United States .....	Receiving ship, Portsmouth, N. H.	Housed over ..
Independence ..	1837	do .....	do .....	Receiving ship, Mare Island, Cal.	do .....
St. Louis .....	1828	Washington .....	do .....	Receiving ship, League Island.	do .....
Dale .....	1839	Philadelphia, Pa. ....	do .....	Receiving ship, Washington.	do .....
New Hampshire.	1818	Kittery, Me. ....	do .....	In ordinary, at navy-yard, New York.	Ship .....
Vermont .....	1818	Boston, Mass .....	do .....	Receiving ship, New York.	Housed over ..

of the U. S. Navy—Continued.

FOR SEA SERVICE.

Dimensions.			Displacement.	Indicated horse power.	Speed in knots.	Batteries.		Coal capacity.	Complement.	
Length between perpendiculars.	Breadth.	Mean draft.				Main.	Secondary.		Officers.	Men.
<i>Ft. In.</i>	<i>Ft. In.</i>	<i>Ft. In.</i>	<i>Tons.</i>					<i>Tons.</i>		
137 0	26 0	9 6	450	340	10.0	None.....	None .....	80		
225 0	44 0	18 6	2,900	1,024	9.0	.....	.....	240	32	285
265 9	54 3	24 3	5,170	1,050	9.0	4 1X" S. B. ....	2 20-pdr. B. L. R. .... 6 12-pdr. S. B. hwizr. ....			
282 7	51 4	23 0	4,650	950	9.15	18 1X" S. B. ....	2 20-pdr. B. L. R. .... 2 12-pdr. S. B. hwizr. ....			
264 8½	51 4	23 0	4,700	1,000	9.25	8 1X" S. B. .... 1 60-pdr. B. L. R. ....	1 Gatling. 2 3" B. L. H. .... 2 20-pdr. B. L. R. .... 2 12-pdr. S. B. hwizr. ....			
175 0	45 0	20 0	2,200	.....	.....	4 32-pdr. S. B. ....	1 12-pdr. S. B. hwizr. ....			
180 0	51 6	21 6	3,270	.....	.....	6 32-pdr. S. B. ....	3 12-pdr. S. B. (light) 1 12-pdr. S. B. (heavy). 1 3" B. L. H. ....			
126 6	32 8	15 6	830	.....	.....	None .....	None .....			
117 7	33 10	14 9	675	.....	.....	do .....	do .....			
196 3	53 0	25 6	4,150	.....	.....	do .....	do .....			
196 3	53 0	25 6	4,150	.....	.....	do .....	do .....			

\*Anthracite.



## APPENDIX G.

## SHOWING CONDITION OF WORK JULY 1, 1892, ON VESSELS BUILDING OR COMPLETING AT NAVY-YARDS OR UNDER CONTRACT AT PRIVATE YARDS.

OFFICE OF THE NAVAL CONSTRUCTOR,  
Navy-yard, New York, August 10, 1892.

SIR: Replying to letter of Bureau of Construction and Repair of July 13, 1892, No. 8750-92, I forward herewith reports showing state of work on July 1 on U. S. S. *Maine*, *Puritan*, *Terror*, and *Cincinnati*.

The estimate of percentage of completion does not include delay and expense due to subsequent changes and tardy deliveries of material.

The work on all of these vessels is now being delayed by the nondelivery of sponson, barbette, and side armor.

In many instances this delay in delivery of armor causes great additional expense by the irregular way in which work has to be carried on.

The final completion of these vessels must depend very largely upon the promptness with which material, especially armor, is supplied.

Very respectfully,

F. L. FERNALD,  
Naval Constructor, U. S. Navy.

COMMANDANT NAVY-YARD AND STATION, New York.

## STATE OF WORK ON TERROR, JULY 1, 1892.

The following is a list of the items completed:

Hull: Outside plating, stem, stern-post, rudder, shaft tubes and struts, armor shelf, wood backing for side armor, superstructure framing, and side plating.

Hold: Inner bottom, chain lockers, ceiling in store rooms and forward magazines.

Bulkheads: All longitudinal and transverse bulkheads, except where otherwise noted.

Berth deck: Framing, plating, and planking, windlass and bed, except engine.

Main deck: Framing and plating.

Superstructure deck: Framing, metal work of hammock berthing.

Miscellaneous: Military mast; all boats except new gig.

The degree of completion of other items commenced is as follows:

Hold: Manholes, 75 per cent.

Main deck: Changing and fitting hatches, 20 per cent.

Bulkheads: No. 64, 30 per cent; No. 120, 90 per cent.

Miscellaneous: Water-tight doors below main deck, 80 per cent; chain pipes, 10 per cent; air ports and deck lights, 75 per cent; ventilation trunk, 40 per cent; skid beams, 50 per cent; superstructure deck plating, 50 per cent; turret, framing and backing, 80 per cent (not including dividing bulkheads and shell of conning tower); drainage completed below berth deck, except under engine and fire rooms and certain sluice valves; flood cocks all fitted except in ammunition room; ventilation, 50 per cent; furniture ready for finishing touches; boats completed except gig, which is 60 per cent completed.

Considering the time necessary to fit this vessel in all respects ready for sea, I estimate the work as 80 per cent completed.

## STATE OF WORK ON PURITAN, JULY 1, 1892.

The following items have been completed:

Hull: Outside plating, stem, stern-post, rudder, shaft struts and tubes, armor shelf.

Hold: Inner bottom, engine and boiler bearers.

Bulkheads: Transverse and longitudinal bulkheads, except those noted below.

Berth deck: Framing and plating, windlass and bed, except engine.

Main deck: Framing, plating except recalking, bits except resecuring, barbette framing and plating, wood backing on barbettes.

Miscellaneous: Molds for side armor; boats ready for finishing touches, except two cutters noted below.

The degree of completion of other items commenced is as follows:

Hull: Framing and side plating of superstructure, 80 per cent, awaiting material; air ports in superstructure, 70 per cent cut; hammock berthing, 10 per cent.

Hold: Manholes cut; stanchions, 40 per cent.

Transverse bulkheads: On frame No. 29, 75 per cent; on frame No. 86, 70 per cent; on frame No. 98 on berth deck, two plates left off for transporting material; on frame No. 108, 60 per cent riveted.

Longitudinal bulkheads: From frame No. 29 to No. 39 above berth deck, 80 per cent; from frame No. 29 to 33 in hold under turrets, 50 per cent, awaiting material; cone bulkhead under after turret, completed except door; under forward turret, 90 per cent fitted.

Berth deck: Hatches, 10 per cent; deck planking forward of station No. 20, 80 per cent; stanchions, 40 per cent.

Main deck: Deck lights, 50 per cent cut.

Superstructure deck: Framing and plating, 60 per cent.

Miscellaneous: Turret, framing and plating, 50 per cent; wood backing for side armor, 60 per cent; steering gear, except engine, ready to be placed; water tanks, 90 per cent; rollerspath for turrets, 18 per cent; drainage, 20 per cent; ventilation, 20 per cent completed; boats completed, except two 26-foot cutters to replace ones taken for *St. Marys*, which are 70 per cent completed; furniture nearly completed.

Alterations and additions: Transverse bulkhead on frame No. 27 below berth deck, 30 per cent; shaft alley bulkheads from frame No. 81 to No. 89, 40 per cent; longitudinal bulkheads in hold between frames No. 86 and No. 94, 60 per cent; between No. 97 and No. 100, 50 per cent.

Considering the time necessary to complete this ship in all respects ready for sea, I estimate the work as 70 per cent completed.

#### CONDITION OF WORK ON CINCINNATI, JULY 1, 1892.

##### Ship on stocks.

Hull: Outside plating below gun deck, bilge keels, stem, stern-post, shaft struts, and shaft tubes completed; rudder completed and in place; sponsons, framing completed; plating in position ready to be riveted; outside plating in wake of poop and forecastle, 90 per cent completed; hammock berthing, frames completed; inside and outside plating in place; bridge over berthing, 30 per cent completed.

Hold: Inner bottom completed; manholes to inner bottom, 95 per cent completed; engine bearers completed; boiler bearers in place and 30 per cent riveted; bulkheads, athwartship and longitudinal, completed, except riveting portion necessary to be removed in placing engines and boilers; stanchions, 90 per cent completed; magazines and ammunition rooms, metal work completed.

Platform decks: Framing and plating completed; stanchions, 90 per cent completed.

Protective deck: Framing and plating completed except riveting portion necessary to be removed in placing engines and boilers; cofferdams, 95 per cent in place and riveted; 80 per cent calked; 6-inch gun support completed; bulkheads between protective and gun decks, athwartship, 95 per cent completed; longitudinal plates and angles fitted ready to be bolted up; coaling trunks, 90 per cent completed; overhead track in bunkers, 35 per cent completed.

Berth deck: Beams, 85 per cent completed; plating, 45 per cent completed; air ports on berth deck, not including casings and lenses, 90 per cent completed; stanchions, 65 per cent completed; hatches, 60 per cent completed.

Gun deck: Framing and plating completed, except in wake of engine and boiler hatches; gutter angles completed; casings to engines and boiler hatches, 85 per cent in place, not riveted; hatch coamings, 70 per cent completed; bulkheads under forecastle, 85 per cent completed; bits completed; hawse pipes, 95 per cent completed; supports for 5 inch guns on poop deck, 80 per cent completed; stanchions, 65 per cent completed.

Poop and forecastle decks: Framing completed, except in wake of armor shields for guns; plating, 60 per cent completed; bulkhead at break of poop bolted up, not riveted; hatch coamings, 35 per cent completed; foundation for capstan on poop deck bolted up.

Miscellaneous: Tube for conning tower in place; shields for rapid-fire guns shaped and in place; foundation for windlass bed completed; steering engine in place; steering gear, not including hand wheels, 85 per cent completed; drainage, including scuppers, 85 per cent completed; ventilation, 50 per cent completed; water tanks, 75 per cent completed; water-tight doors, 75 per cent completed; water-tight hatches, 30 per cent completed; armor hatches, 65 per cent completed; joiner work, 35 per cent completed; masts commenced; mast partners, 90 per cent completed; mooring staples, 95 per cent completed; blocks, 50 per cent completed; cooperage completed, except finishing touches; boats, 60 per cent completed; furniture, 65 per cent completed.

Alterations and additions: Change in coal bunker bulkheads to accommodate main steam pipes completed; change in bulkhead No. 23 on platform deck commenced; changes in metal bulkheads on gun and berth decks made necessary by change in quarters, completed; changes in torpedo ports and in cofferdams made necessary by new location of torpedo ports commenced; ammunition hoists for 5-inch guns on poop commenced.

Considering the final completion of this vessel in all respects ready for sea, I consider that the work is 73 per cent completed.

#### CONDITION OF WORK ON MAINE, JULY 1, 1892.

Ship moored alongside wharf.

Hull: Outside plating completed; bilge-keels, stem, sternpost, shaft, shaft tubes, and rudder completed.

Hold: Inner bottom completed, manholes completed, except a few in engine room; engine and boiler bearers completed; bulkheads completed, except between engine rooms; magazines, and ammunition rooms, metal work completed except flat over 10-inch magazine; stanchions, 90 per cent completed.

Platform deck: Structural portions completed; stanchions 80 per cent completed.

Protective deck: Protective deck including after inclined portion completed; 6-inch armored bulkhead on station No. 24, armor plates in position and holes cut; will be bolted up as soon as rubber washers are received.

Berth deck: Framing and plating completed; wood flat completed abaft station No. 76; 20 per cent completed between No. 76 and No. 68; metal bulkheads on berth deck completed; casings to engine, boiler, and ventilating hatches, 85 per cent completed; stanchions, 90 per cent completed; coffer dams, 90 per cent completed; armor gratings, 90 per cent completed; coaling scuttles, 75 per cent completed; air ports and casings, 80 per cent completed except lenses.

Main deck: Framing and plating, completed; wood flat within after superstructure, completed; stanchions, 75 per cent completed.

Superstructures: Framing and side plating completed; air ports, shutters and castings completed except lenses; six-inch gun supports, conning tower support and framing, and shell of conning tower completed; cork painting in after superstructure, 75 per cent completed.

Superstructure decks: Framing, plating and gutters completed; wood flat, 75 per cent completed; hammock berthing, 75 per cent completed; hatch coamings, 95 per cent completed; towing bitts and cable nippers, 97 per cent completed; girder between central and after superstructure, metal work, 90 per cent completed; windlass in place.

Miscellaneous: Barbettes, framing completed; wood backing, 95 per cent completed. Turrets, framing and shell, 78 per cent completed; roller path for turrets, 85 per cent completed; rollers and live rings, 90 per cent completed; supports for boat cranes, 90 per cent completed; steering engine in place; steering gear, not including hand wheels and ropes, 97 per cent completed; drainage, including scuppers, 78 per cent completed; water-tight doors in superstructure and funnel casings, 80 per cent completed; steps for boat davits in wake of after superstructure completed; water-tight doors below main deck, 70 per cent completed; water-tight hatches, 75 per cent completed; armor hatches, 65 per cent completed; ventilation, 75 per cent completed; stanchions for awning and guard rails on main deck, forgings completed; joiner work, 40 per cent completed; masts and tops, except topmasts, 95 per cent completed; chain plates, 50 per cent; boats, 35 per cent completed; furniture, 65 per cent completed.

Alterations and additions: Hawse pipe and chain pipe, 75 per cent completed; metal flat over 10-inch magazine, forward and aft, 90 per cent completed; mast partners completed; ammunition hoists, 25 per cent completed; patterns for shaft struts, 95 per cent completed; skylight on main deck over ward room just commenced; 6-inch magazines forward, 12 per cent completed; bulkhead on No. 26 commenced; doors in funnel casings on berth deck, 15 per cent completed.

Considering the completion of this vessel in all respects ready for sea, I estimate the work as 85 per cent completed.

NAVAL CONSTRUCTOR'S OFFICE, UNITED STATES NAVY-YARD,

Norfolk, Va., July 16, 1892.

SIR: Referring to the letter of the Bureau of Construction and Repair, No. 8750, dated July 13, 1892, I have the honor to submit the following report giving in detail the actual condition of work on the U. S. S. *Raleigh* to-day, following as far as practicable the headings of paragraphs of the specifications:

Flat keel plates, vertical keel, stem, sternpost, stern frame: Completed.

Rudder: Completed but not shipped.  
 Transverse frames, flat keelson plates, longitudinals: Completed.  
 Outside plating: Completed, except in wake of 4-inch armor around gun ports.  
 Inner bottom: Completed.  
 Beams: Completed, except skid beams for boats, and gun and protective deck beams removed to admit boilers.  
 Center line bulkhead and passage: Fitted in place; removed between boiler rooms at present to admit boilers.  
 Deck stringers and plating: Completed, except gun and protective decks in wake of boiler room openings now taken up to admit boilers.  
 Platform plating: Completed.  
 Gutters on gun deck: Fitted and partially riveted.  
 Transverse watertight bulkheads, coal bunker and other fore and aft bulkheads (except center line bulkhead): Completed below protective deck, and above, except in way of opening for admission of boilers.  
 Stanchions: Completed.  
 Gun supports: Completed.  
 Sponsons for guns: Three-fourths completed; more can not be done until arrival of 4-inch armor.  
 Engine, boiler, and shaft bearers: Completed, except riveting boiler bearers, which can not be done until boilers are in ships.  
 Shaft tubes and struts: Completed.  
 Water-tight doors: Very nearly completed, except fitting rubber to hinged doors.  
 Plank sheers: Half completed on forecastle and poop decks.  
 Deck plank: Poop and forecastle decks, three-fourths completed; gun deck, one-half completed; berth deck, one-fourth completed.  
 Hammock berthing and fore and aft bridges: Fitted and half riveted.  
 Freeing ports: Cut and trunks through berthing fitted.  
 Fixed coal chutes: Fitted.  
 Hatch coamings and skylights: Coamings completed, except boiler and engine hatches.  
 Gratings and hatch covers: Begun.  
 Cofferdams: Half ready for filling; remainder lack cementing and painting only.  
 Coaling trunks: one-fourth fitted.  
 Magazines, shell rooms, fixed ammunition room: Plate and angle work completed.  
 Deck lights: Completed in fore-castle deck.  
 Air ports: Completed.  
 Mast partners, mast steps: Completed.  
 Capstan and windlass, manger, bow stoppers, deck pipes, hawse pipes, warping and towing bitts, cable bitts: Completed.  
 Galley house: Plate and angle work completed.  
 Conning tower, shield, and tube: Secured in place.  
 Water closets: Plumbing fittings received and fitting them on ship begun.  
 Wardroom, junior officers' quarters, cabin, warrant officers' quarters: Joiner work, one-fourth completed in shop.  
 Trimming tanks: Completed.  
 Water tanks: Completed, except pumping connections.  
 Drainage and pumping: Main and auxiliary drainage system completed, except steam pumps and connections (part removed to admit boilers), sluice valves completed; hand pumping arrangements completed, except fresh water system, and those for water closets, lavatories, galley, etc., fire main and coal-bunker drainage not begun.  
 Chain lockers: Plate and angle work completed.  
 Scuppers: One-half completed.  
 Bilge keels: Completed.  
 Ventilation: blowers in place; branch ducts and greater part of main ducts completed in shop; automatic valves completed in shop, and one-fourth in place; butterfly valves completed in shop and three-fourths in place; copper cowls completed in shop; bunker ventilation not begun.  
 Steering arrangements: Completed in shop; erection in ship begun.  
 Guard rail stanchions: All made.  
 Awning stanchions: All made; three-fourths erected.  
 Attachments for rigging: Fitted.  
 Ensign staff: Ensign and jack staffs completed.  
 Figures for draft of water: Marked before launching as required.  
 Cementing: Interior work very nearly completed; outside plating one-half completed.  
 Heeling ship: Completed.  
 Testing water-tight compartments: Completed forward of boiler rooms and abaft engine rooms.

Miscellaneous: Painting outside below water line, four coats; double bottom and outside above water line, two coats; other parts, one coat; double bottom one coat of varnish; cork painting: one-half cofferdams completed; water-tight scuttles completed; masts completed and stepped; launching and removing cradle, completed; manholes and covers completed; anchor gear, begun; portable furniture, one-half completed. Boats: one whaleboat, two cutters, dinghy, and gig, three-fourths completed.

Seventy-four per cent of the work completed based on the vessel fitted out and ready for sea.

Very respectfully,

WM. J. BAXTER,  
*Asst. Naval Constructor, U. S. Navy,*  
*Acting in charge of Department.*

Commodore A. W. WEAVER, U. S. Navy,  
*Commandant.*

Respectfully submitted to the Chief of Bureau of Construction and Repair.

A. W. WEAVER,  
*Commodore Commandant.*

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NAVAL CONSTRUCTOR'S OFFICE, U. S. NAVY-YARD,  
*Norfolk, Va., July 16, 1892.*

SIR: Referring to the letter of the Bureau of Construction and Repair, No. 8750, dated July 13, 1892, I have the honor to submit the following report giving in detail the actual condition of work on the U. S. S. *Amphitrite* to-day, following as far as practicable the headings of paragraphs of the specifications:

Main-deck armor plating: Completed, except tap-riveting to top of belt armor; plating shutters and armored water-tight scuttles fitted; armored gratings received.

Berth-deck plating: Completed.

Transverse bulkheads: Completed.

Fore and aft bulkheads: Completed.

Water-tight doors, sluice valves, etc.: Doors completed, except in superstructure and fitting rubber in some others; sluice valves begun, manholes and covers completed.

Holes in bulkheads for engineer's pipes: Made water-tight, as required, where pipes are in.

Chain lockers: Plate and angle work completed.

Stanchions: Completed.

Superstructure framing, deck beams, plating, deck stringers, tie plates, and deck plating: Completed.

Half beams and ledges: Completed on all decks.

Skid beams: Completed.

Hammock berthing: Completed, including rails and molding.

Magazines, shell rooms, handling rooms, fixed-ammunition rooms: Plate and angle work completed.

Plank sheer: Fitted and temporarily secured.

Superstructure deck planking: Completed.

Main deck planking: Completed within superstructure; one-third completed at ends.

Berth deck planking: Completed.

Barbette turrets: Barbette framing completed.

Armored smoke pipe and armored ventilator: Bomb proof gratings received; all armor molds made, and all except bolt shutters sent to contractors.

Wood backing: All completed ready for fitting armor.

Ceiling in hold, store rooms, etc.: About three-quarters completed.

Military masts, mast step: Completed; mast stepped.

Ward room, cabin, junior officers' quarters, warrant officers' quarters: Joiner work about one-third completed in shop.

Hatch coamings and skylights: Coamings completed; flush water-tight covers, and wood covers to berth deck hatches and scuttles completed.

Gratings and hatch covers: Gratings received; hatch covers completed.

Awning and life line stanchions: All made.

Deck lights: Completed.

Air ports: Completed.

Coal scuttles: Completed.

Water tanks: Completed.

Chain stoppers: Received.

Hawse pipes: Completed except water-tight arrangements.

Mooring bitts; towing bitts: Secured in place.

Warping chocks: Secured in place.

Canopies: About one third completed.

Boats: One whale boat, gig, and dinghy about three-fourths completed.

Boat davits: derricks and cradle: Derricks completed; davits begun.

Steam capstan windlass and winch: Completed except steam connections.

Steering apparatus: Completed except steering wheels and connections to them, and telltales.

Drainage and pumping arrangements: Main drainage arrangements three-fourths completed; magazine flooding and drainage, hand-pumping arrangements, and fire main not yet begun.

Ventilation: Blowers in place; air ducts one-fourth completed.

Portable furniture: About one-half completed in shop.

Calking: All decks now laid calked with one thread of cotton and two of oakum.

Painting, etc.: Below berth deck and under superstructure iron work has had one coat of cork paint and one coat white paint.

Tearing out old work interfering with alterations: closing up old hatches and cutting new ones; cutting out and closing up old deck lights.

Miscellaneous: Superstructure deck scuppers and freeing ports, half completed; clip rings for turrets fitted.

Turret rollers: Roller tracks received.

No armor has been received.

Forty-nine per cent of the work completed based on vessel fitted out and ready for sea.

Very respectfully,

WM. J. BAXTER,  
*Assistant Naval Constructor, U. S. Navy.*  
*Acting in charge of Department.*

Commodore A. W. WEAVER, U. S. Navy.  
*Commandant.*

Respectfully submitted to the chief of Bureau of Construction and Repair.  
A. W. WEAVER,  
*Commodore, Commandant.*

NAVAL CONSTRUCTOR'S OFFICE, U. S. NAVY-YARD,  
*Norfolk, Va., July 16, 1892.*

SIR: Referring to the letter of the Bureau of Construction and Repair, No. 8750, I have the honor to submit the following report, giving in detail the actual condition of work on the U. S. S. *Texas* to-day, following as far as practicable the headings of paragraphs of the specifications:

Keel, stem, and ram, stern post, rudder, shaft tubes, and struts, longitudinals, transverse frames, water courses: Completed.

Outside plating: Completed, except riveting of plates that must be removed to put in bulkheads and redoubt armor.

Armored side, armored bulkheads, armored redoubt: Completed ready to receive armor.

Turrets: Forward one completed, except putting on upper roller track, armor, and backing; after one same, except riveting and calking part above armor shelf and fitting top.

Inner bottom: Completed.

Transverse bulkheads, coal bunker, and other fore and aft bulkheads: Completed.

Central passage, central magazine, and shell rooms: All plate and angle work fitted; riveting can not be done until boilers are in ship.

Engine and shaft bearers, boiler bearers, etc.: Engine and shaft bearers completed; boiler bearers fitted, can not be riveted until boilers are in ship.

Water-tight doors, etc.: Water-tight doors and water-tight scuttles nearly completed, except fitting rubber to hinged doors; sluice valves, completed; manholes and covers, completed.

Deck beams, half beams and carlings, knees: Completed, except for flying deck, which can not be erected and riveted until boilers, engines, and redoubt armor are in place.

Deck plating and stringers: Platforms completed; protective deck completed, except riveting in wake of engine hatches, where deck must be removed to get in machinery; berth deck completed; main deck same as protective deck; upper deck completed, except riveting plates that must be removed to get engines and redoubt armor in place.

Hammock berthings: Fitted; can not be riveted until boilers are in.

Deck plank: Upper and main decks completed forward as far as can be done until redoubt armor is in place; begun aft.  
 Hatch coamings and skylights: Coamings three-fourths completed.  
 Mast partners: Mast steps, fitted.  
 Stanchions: Completed.  
 Bilge keels: Completed.  
 Air ports: Holes cut, three-fourths fitted, one-fourth secured.  
 Draft of water figures: Marked before launch as directed.  
 Chain lockers: Plate and angle work completed.  
 Drainage and steam-pumping arrangements: Main drainage system completed, except steam pumps and connections.  
 Hand pumps, sluice valve, etc.: Hand-pumping arrangements one-half completed; sluice valves completed, fire main not begun.  
 Steering apparatus: Erected in ship.  
 Steam-steering engine, etc.: Three-fourths erected in ship, hand wheels and connections, telltales, etc., not begun.  
 Capstans, windlass, etc.: Main capstan windlass and engine completed; after capstan not received.  
 Anchor davits: Port one completed; starboard one finished in shops.  
 Cable bitts: Completed.  
 Hawse pipes, bow stoppers: Completed.  
 Fittings for anchors: Completed for port bower; half completed for starboard one.  
 Deck pipes: Completed.  
 Boats: One whale boat three-fourths completed.  
 Ensign staffs: Ensign and jack staffs completed.  
 Water tanks: Completed, except covers.  
 Guard rails and stanchions: Stanchions made.  
 Towing and warping bitts: Three-fourths completed.  
 Awning stanchions: Completed.  
 Coaling scuttles and ports: Cut and fitted.  
 Coal chutes: Fitted.  
 Heeling ship: Completed.  
 Cement: Inside of bottom completed.  
 Painting: Outside below water-line, five coats; double bottom, three coats; one-half inside two coats; other parts one coat.  
 Miscellaneous: Sponsons three-fourths completed; armor molds all made and shipped; armor shutters, three-fourths completed; boiler casings, fitted; roller tracks received; rollers one-fourth completed; launching and removing cradle completed.  
 Sixty-nine per cent of the work completed based on ship fitted out and ready for sea; no armor has been received.

Very respectfully,

WM. J. BAXTER,

*Assistant Naval Constructor U. S. Navy, acting in charge of Department.*

Commodore A. W. WEAVER, U. S. Navy,  
*Commandant.*

Respectfully submitted to the Chief of Bureau of Construction and Repair.

A. W. WEAVER,  
*Commodore, Commandant.*

NAVAL CONSTRUCTOR'S OFFICE,  
*Navy Yard, Mare Island, Cal., August 6, 1892.*

SIR: In obedience to the order contained in the letter of the Bureau of Construction and Repair, No. 8750-92, of the 13th ultimo, I have the honor to make the following report on the condition of the work on the *Monadnock*, following the headings of paragraphs in the specifications.

Main deck armor plating: Lower course completed, except in wake of boiler openings. Upper course completed, except in wake of boiler openings, and except the plates over the armor belt, which are all in place except Nos. 1 to 3, 6 to 14 inclusive on port side, and 1, 2, and 12 starboard.

Berth deck plating: Completed, but now partly removed to refit work around shaft tubes in double bottom.

Transverse bulkheads: All to be generally gone over to insure their water tightness; No. 8, completed, except water-tight door; No. 17, erected, riveting and calking not completed, water-tight door to be fitted; No. 34, completed, except water-tight doors; No. 47, erected, riveting and calking not completed, water-tight doors to be fitted; No. 57, 68, 77, erected, to be riveted and calked when boilers and engines are in, water-tight doors to be fitted; No. 86, erected, riveting and

- calking not completed, water-tight doors to be fitted; No. 97, completed, except water-tight doors; No. 110, erected, bottom bar being riveted to make water-tight—water-tight doors to be fitted; No. 120, erected, riveting and calking being gone over to make water-tight.
- Fore and aft bulkheads: To be generally gone over to insure water-tightness. Longitudinal passageway bulkheads erected, partly riveted and calked. All water-tight staples on armor deck beams in passageway, on starboard and port sides are fitted, partly riveted and calked. Longitudinal coal bunker bulkheads are erected and partly riveted, but not calked. On starboard side two-thirds water-tight staples are fitted and partly riveted, but not calked. All of the longitudinal passageway and berth deck door frames are completed, but not riveted. Recesses in engine rooms being cut to suit engineer's valves.
- Water-tight doors: All longitudinal passageway and berth deck doors are completed, but not fitted or riveted to their respective bulkheads.
- Chain lockers: Top and bottom connecting angles are partly riveted, but not calked. All of the bulkhead plates are erected, but not calked.
- Stanchions: Partly fitted in place.
- Superstructure framing and deck beams: Completed except in wake of boiler opening.
- Superstructure plating: Completed, except two end plates at each end.
- Superstructure deck stringers, tie plates, and plating. In place, but not riveted.
- Half beams and ledgers: In place and completed.
- Skid beams: Erected and completed, supports not yet erected.
- Hammock berthing: Steel work completed.
- Magazines: Steel work completed, except tops of light-boxes.
- Shell rooms: Forward and after steel work completed, except tops of light-boxes.
- Handling rooms: Forward and after steel work completed, except some calking, and doors to be made and fitted.
- Fixed ammunition rooms: Steel work was completed, but riveting is being cut out in outboard bulkhead on either side to get at the shaft tubes.
- Belt armor: Side lined off and plates ordered, templates prepared and shipped to armor makers. Vertical stiffeners on plating behind armor cut off and to be re-fitted to insure water-tightness and remedy defects. A large number of rivets cut out on seam strap to be re-driven double countersink, so as to allow fitting of armor bolts.
- Barbette turrets: Forward and after turret supports are completed; doors made, but not fitted; backing plates for both turrets in place. Top and bottom angles and top rim plate are in place, but are only partially riveted. Work on racks and roller paths is progressing.
- Armored smoke pipe and armored ventilators: Armor bolts and wood backing ordered.
- Gun supports: The bridge frame and stanchions are erected, but not riveted.
- Military mast and top: Mast plates have been put together, riveted, and partly calked. Rings are being fitted. Doors to be made. The cheek plates are being riveted in place. Plates of the top are erected, riveted, and are being calked.
- Dispensary: Steel work completed; doors hung.
- Engineers and ordnance workshop: Steel work completed; doors hung.
- Firemen's washroom: Bulkheads erected and riveted.
- Hatch coamings: Working on main deck coamings. Coamings on berth deck almost ready to go in place.
- Hatch covers (water-tight): Work on the six main-deck hatch covers well advanced. Three hatch covers on the berth deck forward are completed and three hatch covers on the berth deck aft are well advanced, but are yet to be riveted in place in order to complete.
- Deck lights: Work is progressing on all deck light and ventilator castings. Forty-seven ventilator castings are erected. Deck lights are cast and are being finished.
- Air ports: Work progressing on thirty-two air ports; all cast.
- Coal scuttles: Covers, grating, and battle plates not yet fitted.
- Water tanks: Forward water-tank bulkheads are erected and riveted, but not yet calked.
- Derrick booms: Plates for one boom riveted and partly calked; brass work gotten out.
- Windlass bed: Wood decking under windlass bed is completed and bed plate down and bolted; fitting bearers and engines.
- Ventilation: Plans have been submitted for the ventilation.
- Testing water-tight compartments. Some of the compartments of the old double bottom have been tested and also old collision bulkheads. A large amount of work remains to be done in making original contract work in the double-bottom water tight.



Much of the riveting aft in the inner bottom is being cut out to get at the shaft tube. Extra stiffenings are being fitted between main framing and shaft tube. Extra stiffenings are being fitted in connection with struts.

The ship is now in dock; the work mentioned above necessary to be done in dock is under way. There being no reliable reference line for the shafting, the propeller shafts have been withdrawn by the Department of Steam Engineering and correct lines of shafting are being established. When this is done the engine seatings and stiffening in the double bottom for same will be fitted. The boiler seatings are partially fitted and all stiffening in double bottom for them completed.

Where headings of paragraphs of specifications are not mentioned, no work has been done on them or work has been reported completed. Work completed, including old work done under contract, based on the final completion of the vessel and outfit, ready for sea, I estimate at 52 per cent.

I have the honor to forward herewith three views of the vessel (negatives with two prints of each).

The only vessel under repair at the present time is the *Thetis*; percentage of work to be done to complete, two-tenths; time required, six days.

Very respectfully,

J. H. LINNARD,  
Naval Constructor, U. S. Navy.

Rear Admiral JOHN IRWIN, U. S. Navy,  
Commandant Navy-Yard, Mare Island, Cal.

OFFICE OF SUPERINTENDING CONSTRUCTOR, U. S. NAVY,  
BATH IRON WORKS,  
Bath, Me., August 16, 1892.

SIR: In accordance with the Bureau's letter No. 8750-92, dated July 13, 1892, "relative to a report giving in detail the condition of work on the several vessels, following, as far as practicable the items given by headings of paragraphs in the specifications; the percentage of work completed under contract; estimated dates of contractors' trial, and final delivery to the Government," I respectfully submit the following:

#### HARBOR DEFENSE RAM NO. 1.

Hull and shipfitters' work: Flat keel, vertical keel, stem, and rudder post, completed; rudder, forged; shaft tubes, partly completed.

Hull and shipfitters' work: Struts, longitudinals, armor shelf, transverse frames, double reverse bars, and floor plates, partly completed; special frames, partly completed, as originally designed (extra ones placed in ship); water-tight frames, completed; transverse B. H., partly completed; girders, upper deck beams, completed; berth deck beams, berth deck stringer plating, one half completed; engine, boiler, and shaftbearers, partly completed; skid beams and deck stanchions, nothing done; hatch coamings, covers, and canopies, nothing done; outside plating and flat keelson, completed; inner bottom, partly completed; coal bunkers, one half completed; other fore and aft B. H.'s one half completed; coal bunker alarms, shaft alley, and boat cradle and rest, nothing done; galley inclosure, one half completed; water tanks and oil tanks, nothing done.

Armor: Side armor, plans made; deck armor, material ordered; backing plates, three-fourths completed; armor fastenings, ordered; conning tower, armored smoke pipe, and armored ventilator, material ordered; special work connected with armor, completed.

Forgings: Boat davits, mooring staples, hatch cranes, awning and life-line stanchions, lumber irons, eye bolts in beams, ring bolts, grab rods, hammock hooks, clamps and handles for water-tight doors, socket levers for water-tight doors, rounds for ladders, bands and fittings for swinging boom, guards for life buoys, arm and braces for bell stanchions for running light-boxes, nothing done.

Castings: Ship's bell nothing done; sluice valves, deck-plates, warping or towing bits and warping chocks partly completed; quadrant (for steering-gear) patterns made. Coal scuttles and sea-steps, nothing done; hawse pipes patterns made.

Joiner work: Wardroom, fore and aft bulkheads, stationary blinds, bulkheads between staterooms, berth fronts, drawers and lockers, material out, ready to be erected; wire-panels in B. H., nothing done. Doors in athwartship, B. H., nothing done; paneling overhead ready to be erected. Chronometer and compass lockers or chests, lamp room, storerooms, and engineers' log room, nothing done; pantries, material out, ready to be erected. Ammunition room, nothing done; mess tables and benches for crew ready to be erected. Reels, ladders to companion-ways, and musket racks, nothing done. •

**Carpenter's work:** Berth-deck plan, swinging booms for bolts, signal and ensign staff, shoveling flats in bunkers, gratings in storerooms, and ceiling in hold, nothing done; wood backing three-fourths completed.

**Plumber's work:** Water closets and bath tubs, nothing done.

**Sundry fittings:** Water-tight doors, holes in B. H.'s for engineer's pipes, and clothes and mess lockers for crew, nothing done; decklights and life buoys, partly completed; running lights, label plates, steering arrangement, electric call bells, speaking tubes and telegraphs, etc., shaft indicators, nothing done; sounding tubes, steam windlass, figures for draft of water, ventilation, and ventilation of coal bunkers, partly completed; fresh air supply pipes to coal bunkers, nothing done; drainage and pumping arrangements, partly completed; water alarms, electric lighting, portable furniture, cooperage, and miscellaneous outfit, nothing done.

**Boats:** One 28-foot steam whale boat partly planked; one 28-foot cutter one-half planked; two 29-foot whale boats framed out.

Eight-twentieths of the work under contract completed. Contractors state "the harbor defense ram No. 1 will be ready for contractors' trial about six months after receipt of 'armor,' and ready for final delivery to the Government in two months after trial trip."

Very respectfully,

JOHN B. HOOVER, U. S. Navy,  
*Superintending Constructor.*

Chief Constructor T. D. WILSON, U. S. Navy,  
*Chief of Bureau of Construction and Repair,  
Navy Department, Washington, D. C.*

OFFICE OF SUPERINTENDING CONSTRUCTOR, U. S. NAVY,  
BATH IRON WORKS,  
*Bath, Me., August 16, 1892.*

SIR: In accordance with the Bureau's letter No. 8750-92, dated July 13, 1892, relative to a report giving in detail the condition of work on the several vessels, following as far as practicable the items given by headings of paragraphs in the specifications, the percentage of work completed under contract, estimated dates of contractor's trial, and final delivery to the Government, I respectfully submit the following:

GUNBOAT NO. 5 "MACHIAS."

**Keels; outer, inner, and vertical:** Completed.

**Flat keelson:** Completed.

**Stem:** Completed.

**Stern post:** Completed.

**Stern framing:** Completed.

**Rudder:** Completed.

**Transverse frame:** Completed.

**Beams:** Water-tight, platform, poop and fore-castle deck, gun-deck, berth-deck, half beams and carlings, and skid beams for boats: Completed.

**Longitudinals:** Completed.

**Outside plating:** Completed.

**Breast hook:** Completed.

**Poop and fore-castle deck stringers and plating:** Completed.

**Gun-deck stringers and plating:** Completed.

**Berth-deck stringers and plating:** Completed.

**Water-tight deck:** Completed.

**Platform plating:** Completed.

**Plating to bottom of magazines, shell, dynamo, and other rooms:** Completed.

**Coal bunker and other fore and aft bulkheads:** Completed.

**Transverse water-tight bulkheads:** Completed.

**Girders to water-tight deck:** Completed.

**Stanchions:** Completed.

**Sponsons for guns:** Main portion completed waiting for "armor."

**Platform for guns:** Main portion completed waiting for "armor."

**Gutters on gun deck:** Completed.

**Engine, boiler, and shaft-bearers:** Completed.

**Holes in bulkheads for engineer's pipes:** Completed.

**Shaft tubes and struts:** Completed.

**Hammock berthing:** Completed.

Freeing ports: Completed.  
Portable coaling chutes: Completed.  
Portable coal bunker bulkheads: Completed.  
Port shutters: Nothing done.  
Mooring staples: Completed.  
Water-tight doors: Completed.  
Water courses: Completed.  
Hatch coamings and skylights: Completed.  
Gratings and hatch covers: Partly completed.  
Canopies: Completed.  
Mast partners: Completed.  
Mast steps: Completed.  
Manger: Completed.  
Galley house, bed, etc.: Completed.  
Galley house, "interior arrangement": Uncompleted.  
Plank sheer or waterway: Completed.  
Deck plank: Poop and forecastle decks and gun deck, completed; berth deck, after end of forward berth deck, "linoleum" substituted for wood: Nothing done.  
Coaling trunks: Completed.  
Coal scuttles: Completed.  
Chain lockers: Completed.  
Water tanks: Completed.  
Cofferdams and passages: Proper completed.  
Cofferdams not packed with "woodite" or its equivalent as yet.  
Passages "linoleum" to be laid: Nothing done.  
Ash chutes: Completed.  
Scuppers: Completed.  
Bilge keels: Completed.  
Windlass bed: Completed.  
Windlass and capstan: Completed.  
Torpedo arrangements: Outboard tube completed; fittings not completed.  
Magazine: Completed, excepting sheathing.  
Shell rooms: Completed, excepting sheathing.  
Fixed ammunition room: Partly completed.  
Torpedo stowage: Nothing done.  
Passing-scuttles: Completed.  
Workshops: Completed.  
Firemen's wash room (proper) completed: interior fittings, partly completed.  
Engineer's stores (space allotted): Nothing done.  
Sail room: Partly completed.  
General storeroom: Partly completed.  
Ceiling in hold storerooms, etc.: Partly completed.  
Drainage and pumping arrangements: Partly completed.  
Trimming tanks: Completed.  
Wood floors in coal bunkers: Nothing done.  
Sounding tubes: One-half completed.  
Sluice valves, pipes, etc.: Completed.  
Ventilation: One-half completed.  
Forced draft in fire room: Nothing done.  
Air ports: Completed.  
Decklights: Completed.  
Deckpipes: Completed.  
Hawse pipes: Completed.  
Bow stoppers: Completed.  
Warping pipes: Completed.  
Warping or towing bitts: Completed.  
Steel wire cable-nippers: Completed.  
Ring bolts in deck: Nothing done.  
Eye bolts in beams: Nothing done.  
Anchor davits: Completed and in ship.  
Bill boards: Completed.  
Boat davits and cradles: Three-fourths completed.  
Hatch cranes: Made, not in ship.  
Sea-steps: Completed.  
Side ladders (material out) not in ship.  
Ladders to hatchways: Made ready to be put in place.  
Iron rounds of ladders: Completed.  
Wooden pilot house: On ship; interior fittings partly completed.  
Steering arrangements: Partly completed.  
Chronometer and compass lockers: Nothing done.

**Wardroom:** Fore and aft bulkheads to staterooms, wood casing to steel bulkheads, doors to staterooms, bulkheads between staterooms, berth, drawers, lockers, blinds, etc., and overhead panelings, completed; circular stairways completed ready to be put in ship; lavatories and water-closets partly completed.

**Junior officers' quarters:** Pullman folding berths or lockers, and casings to water-tight bulkheads, panelings to underside of deck, all doors, etc., partly completed.

**Cabin under poop deck:** Paneling overhead and casing on bulkhead partly completed; captain's stateroom, nothing done; pantry, partly completed; water-closet, nothing done.

**Bulkheads to armory, navigator's and executive officer's office:** Partly completed.

**Pantries:** Partly completed.

**Refrigerating room:** Partly completed.

**Paymaster's office:** Partly completed.

**Dispensary:** Partly completed.

**Water-closets and urinals:** Partly completed.

**Lavatories for officers and crew:** Partly completed.

**Electric lighting (contract awarded):** Nothing done.

**Speaking tubes:** Nothing done.

**Mechanical telegraph:** Nothing done.

**Electric call bells:** Nothing done.

**Mechanical call bells:** Nothing done.

**Bunker fire alarm:** Nothing done.

**Water alarms:** Nothing done.

**Shaft indicators:** Nothing done.

**Steering indicators:** Nothing done.

**Heeling indicators:** Nothing done.

**Running lights, fittings, and screens:** Nothing done.

**Oil tanks:** Nothing done.

**Lamp room:** Partly completed.

**Master-at-arms's locker:** Nothing done.

**Shot racks and musket racks:** Nothing done.

**Lumber irons:** Nothing done.

**Hammock hooks:** Completed.

**Mess and clothes lockers:** Completed. (Changed from wire to wood).

**Swinging tables and benches for crew (not made in ship):**

**Signal lockers:** Nothing done.

**Reels (for steel and other hawsers):** Nothing done.

**Bridge (athwartship):** Partly completed.

**Watch bell:** Nothing done.

**Awning stanchions (made; not in ship):**

**Guard rails and stanchions (made; not in ship):**

**Jacob's ladder:** Nothing done.

**Attachments for rigging, chain plates, bolts, etc.**

**Attachments for rigging made not in ship.**

**Chain plates:** Completed.

**Bolts made; not in ship.**

**Lashing bolts and shackles for securing guns:** Nothing done.

**Chocks for fair-leadors:** Partly completed.

**Pin rails cast; being finished (changed from wood to composition):**

**Brass rubbing plates:** Nothing done.

**Brass label plates:** Nothing done.

**Life buoys (partly made):** Not in ship.

**Swinging booms:** Nothing done.

**Ensign staff:** Nothing done.

**Figures for draft of water:** Completed.

Sixteen-twentieths of the work under contract completed. The contractors state that "the gunboats will be ready for trial trip three months after receipt of armor for these vessels, and final delivery to the Government in one month after trial trip."

Very respectfully,

JOHN B. HOOVER, U. S. Navy,  
Superintending Constructor.

Chief Constructor T. D. WILSON, U. S. Navy,  
Chief of Bureau of Construction and Repair.  
Washington, D. C.

OFFICE OF SUPERINTENDING CONSTRUCTOR, U. S. NAVY,  
BATH IRON WORKS,  
Bath, Me., August 16, 1892.

SIR: In accordance with the Bureau's letter, No. 8750-92, dated July 13, 1892, "relative to a report giving in detail the condition of work on the several vessels following, as far as practicable, the items given by headings of paragraphs in the specifications. The percentage of work completed under contract, estimated dates of contractors' trial, and final delivery to the Government," I respectfully submit the following:

GUNBOAT NO. 6, CASTINE.

Keels: Outer, inner, and vertical, flat keelson, stem, stern post, stern framing, rudder, and transverse frames, completed.  
Beams: Water-tight, platform, poop and forecastle deck, gun deck, berth-deck, half beams and carlings and skid beams for boats, completed.  
Longitudinals: First to third, inclusive, completed.  
Outside plating: Completed.  
Breast hook: Completed.  
Poop and forecastle deck stringers and plating: Completed.  
Gun-deck stringers and plating: Completed.  
Berth-deck stringers and plating: Completed.  
Water-tight deck: Completed.  
Platform plating: Completed.  
Plating to bottom of magazines, shell, dynamo, and other rooms: Completed.  
Coal bunkers and other fore-and-aft bulkheads: Completed.  
Transverse water-tight bulkheads: Completed.  
Girders to water-tight deck: Completed.  
Stanchions: Completed.  
Sponsons for guns: Main portion completed; waiting for armor.  
Platforms for guns: Waiting for armor.  
Gutters on gun deck: Completed.  
Engine, boiler, and shaft bearers: Completed.  
Holes in bulkheads for engineers pipes: Completed.  
Shaft tubes and struts: Completed.  
Hammock berthing: Completed.  
Freeing ports: Completed.  
Portable coaling chutes: Completed.  
Portable coal bunker and bulkheads: Completed.  
Port shutters: Nothing done.  
Mooring staples: Completed.  
Water-tight doors: Completed.  
Water courses: Completed.  
Hatch coamings and skylights: Completed.  
Gratings and hatch covers: Partly completed.  
Canopies: Partly completed.  
Mast partners: Completed.  
Mast steps: Completed.  
Manger: Completed.  
Galley house, bed, etc.; galley house bed, completed. Galley house (proper) completed, interior arrangements not completed.  
Plank-sheer and waterway: Completed.  
Deck plank: Poop and forecastle decks, gun deck, berth deck; forward completed. Berth deck, after end, linoleum substituted for wood: Nothing done.  
Coaling trunks: Completed.  
Coal scuttles: Completed.  
Chain lockers: Completed.  
Water tanks: Completed.  
Cofferdams and passages proper: Completed.  
Cofferdams (to be packed with woodite): Nothing done.  
Passages linoleum to be laid: Nothing done.  
Ash chutes: Completed.  
Scuppers: Completed.  
Bilge keels: Completed.  
Windlass bed: Completed.  
Windlass and capstan: Completed.  
Torpedo arrangements: outboard tube: Completed.  
Torpedo arrangements—fittings: Nothing done.  
Magazines, completed, excepting sheathing.  
Shell rooms, completed, excepting sheathing.

Fixed-ammunition rooms: Partly completed.  
 Torpedo stowage: Nothing done.  
 Passing scuttles: Completed.  
 Workshops: Completed.  
 Firemen's wash-room proper, completed, interior fittings, partly completed.  
 Engineers' stores, space allotted: Nothing done.  
 Sail room: Partly completed.  
 General storeroom: Partly completed.  
 Ceiling in hold and storerooms: Partly completed.  
 Drainage and pumping arrangements: Partly completed.  
 Trimming tanks: Completed.  
 Wood floors in coal bunkers: Nothing done.  
 Sounding tubes: One-half completed.  
 Sluice valves, pipes, etc.: Completed.  
 Ventilation: One-half completed.  
 Forced draft in fire room: Nothing done.  
 Air ports: Completed.  
 Deck lights: Completed.  
 Deck pipes: Completed.  
 Hawse pipes: Completed.  
 Bow stoppers: Completed.  
 Warping pipes: Completed.  
 Warping or towing bitts: Completed.  
 Steel-wire cable nippers: Completed.  
 Ringbolts in deck: Nothing done.  
 Eyebolts in beams: Nothing done.  
 Anchor davits: Completed.  
 Billboard: Completed.  
 Boat davits and cradles: Three-fourths completed.  
 Hatch cranes: Made, not in ship.  
 Sea steps: Completed.  
 Side ladders: Made, not in ship.  
 Ladders to hatchways: Made, not in ship.  
 Iron rounds of ladders: Completed.  
 Wooden pilot house: On ship. Interior fittings partly completed.  
 Steering arrangements: Partly completed.  
 Chronometer and compass lockers: Nothing done.  
 Wardroom.  
 Fore and aft bulkheads to staterooms: Partly completed.  
 Wood casing to steel bulkheads: Partly completed.  
 Wardroom: Doors to staterooms, partly completed; bulkheads between staterooms and berth, drawers, lockers, blinds, etc., completed; overhead paneling, partly completed; circular stairways, made, not in ship.  
 Lavatories and water-closets, partly completed; junior officers' quarters, Pullman folding berths or lockers, and casings to water-tight bulkheads, panelings to underside of deck, all doors, etc., partly completed.  
 Cabin under poop deck: Paneling overhead and casing on bulkhead, partly completed.  
 Captain's stateroom, nothing done; pantry, partly completed; water-closet, nothing done; bulkheads to armory, navigator's and executive officer's office, partly completed; armory, partly completed; navigator's room, partly completed; executive officer's office, partly completed.  
 Pantries: Partly completed.  
 Refrigerating room proper, completed; joiner work: Nothing done.  
 Paymaster's office: Nothing done.  
 Dispensary: Nothing done.  
 Water-closets and urinals: Partly completed.  
 Lavatories for officers and crew: Partly completed.  
 Electric lighting contract awarded: Nothing done.  
 Speaking tubes: Nothing done.  
 Mechanical telegraphs: Nothing done.  
 Electric call bells: Nothing done.  
 Mechanical call bells: Nothing done.  
 Bunker alarms (fire): Nothing done.  
 Water alarms: Nothing done.  
 Shaft indicators: Nothing done.  
 Steering indicators: Nothing done.  
 Heeling indicators: Nothing done.  
 Running lights, fittings, and screens: Nothing done.  
 Oil tanks: Nothing done.

Lamp room: Nothing done.  
 Master-at-arms locker: Nothing done.  
 Shot-racks and musket-racks: Nothing done.  
 Lumber irons: Nothing done.  
 Hammock hooks: Partly completed.  
 Mess and clothes lockers (changed from wire to wood): Partly completed.  
 Swinging tables and benches for crew: Made, not in ship.  
 Signal lockers: Nothing done.  
 Reels (for steel and other hawsers): Nothing done.  
 Bridge (athwart ships): Partly completed.  
 Watch bell: Nothing done.  
 Awning stanchions: Made, not in ship.  
 Guard rail and stanchions: Made, not in ship.  
 Jacob's ladders: Nothing done.  
 Attachments for rigging: Made, not in ship.  
 Chain plates: Completed.  
 Bolts: Made, not in ship.  
 Lashing bolts and shackles for securing guns: Nothing done.  
 Chock for fair leaders: Partly completed.  
 Pin rails: Cast, being finished (changed from wood to composition).  
 Brass rubbing plates: Nothing done.  
 Brass label plates: Nothing done.  
 Life buoys: Made, not in ship.  
 Swinging booms: Nothing done.  
 Ensign staff: Nothing done.  
 Figures for draft of water: Completed.

Sixteen-twentieths of the work under contract completed. The contractors state that "the gunboats will be ready for trial trip three months after receipt of 'armor' for these vessels, and final delivery to the Government in one month after trial trip."

Very respectfully,

JOHN B. HOOVER,  
*Superintending Constructor, U. S. Navy.*

Chief Constructor T. D. WILSON, U. S. Navy,  
*Chief of Bureau of Construction and Repair,  
 Navy Department, Washington, D. C.*

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OFFICE SUPERINTENDING CONSTRUCTOR U. S. NAVY,  
 CITY POINT WORKS,  
 South Boston, Mass., August 20, 1892.

SIR: In compliance with the Bureau's letter No. 8750-92, of July 13, directing that photographic views be taken, showing the progress of the work, and that a special report be forwarded of the condition of the work on U. S. Cruiser No. 11, I have the honor to submit the following report, correct to July 15, 1892.

Vertical keel: Completed.  
 Flat keel: Completed.  
 Stem: Completed.  
 Sternpost: Completed.  
 Stern frame: Completed.  
 Rudder: Complete, except hanging tiller and fitting gear.  
 Transverse frames: Completed.  
 Deck beams: Complete, except short beams in boiler space on gun deck, and few extras on account of changes.  
 Skid beams: Beams received; nothing done.  
 Water courses: Completed.  
 Longitudinals: Completed.  
 Flat keelson: Completed.  
 Outside plating: Complete, except armor plating.  
 Center line bulkhead: Complete, except in boiler space.  
 Transverse W. T. bulkheads: Complete, except in boiler space.  
 Coal bunker and other fore and aft bulkheads: Seven-tenths completed.  
 W. T. deck: Completed.  
 Girders on W. T. deck: Completed.  
 Bilge keels: Completed.  
 Shaft tubes and struts: Completed.  
 W. T. doors: Three-tenths completed.  
 Engine and boiler shaft bearers: Completed.

Gun deck stringers and plating: Completed.  
Berth deck stringers and plating: Completed.  
Breast hook: Completed.  
Platforms: Completed.  
Stanchions: Eight-tenths completed.  
Gutters on gun decks: Five-tenths completed  
Deck planking: Poop, eight-tenths completed; forecabin, seven-tenths completed;  
gun, four-tenths completed; berth, three-tenths completed.  
Hammock berthing: Three-tenths completed.  
Freeing ports: Nothing done.  
Portable coal chutes: Nothing done.  
Machine gun and torpedo port shutters: Nothing done.  
Torpedo arrangements: Ports cut in broadside and stem; stern tubes in yard.  
Spousons for guns: Eight-tenths completed.  
Platform for guns: Nothing done.  
Gun support for 6-inch gun: Completed.  
Mast partners: Completed.  
Windlass bed: Two-tenths completed.  
Mast steps: Completed.  
Hammock hooks: Nothing done.  
Hatch coamings and skylights: Coamings complete; metal skylight and wood sky-  
lights made.  
Bridges: Nothing done.  
Gratings and hatch covers: Nothing done.  
Air ports: Nine-tenths completed.  
Ladder, sea steps, etc.: Nothing done.  
Awning stanchions: Nothing done.  
Guard rail and stanchions: Nothing done.  
Canopies: Nothing done.  
Iron rounds or ladders: Nothing done.  
Ladders to hatches: Nothing done.  
Hatch covers: Nothing done.  
Shot racks and musket racks: Nothing done.  
Attachment for rigging, chain plates, etc.: Two-tenths completed.  
Lashing bolts and shackles for securing guns: Nothing done.  
Chocks for fair leaders: Nothing done.  
Pin rails: Nothing done.  
Lumber irons: Nothing done.  
Life buoy guards: Nothing done.  
Brass rubbing plates: Nothing done.  
Jacob's ladders: Nothing done.  
Running lights: Nothing done.  
Swinging booms: Nothing done.  
Ensign staff: Nothing done.  
Deck lights: Five-tenths completed.  
Watch bell: Nothing done.  
Boats, davits, and cradles: Nothing done.  
Galley house: Five-tenths completed.  
Cofferdams: Five-tenths completed.  
Bow stoppers: Five-tenths completed.  
Hawse pipes: Seven-tenths completed.  
Windlass and capstan: Five-tenths completed.  
Deck pipes: Five-tenths completed.  
Manger: Completed.  
Warping pipes: Nothing done.  
Towing bitts: Sixth-tenths completed.  
Steel wire cable nippers: Sixth-tenths completed.  
Ring bolts in deck: Nothing done.  
Anchor davits: Nothing done.  
Bill boards: Nothing done.  
Conning tower: Two-tenths completed.  
Wood pilot house: Five-tenths completed.  
Steering apparatus: Seven-tenths completed.  
Chain lockers: Eight-tenths completed.  
Water tanks: Nine-tenths completed.  
Ash chutes: Eight-tenths completed.  
Coal scuttles: Five-tenths completed.  
Coal trunks: Five-tenths completed.  
Wood floors in coal bunkers and passage: Nothing done.  
Magazines: Five-tenths completed.



Shell room: Five-tenths completed.  
 Fixed ammunition room: Five-tenths completed.  
 Passing scuttles: Five-tenths completed.  
 Drainage and pumping arrangement: Five-tenths completed.  
 Trimming tanks: Completed.  
 Ventilation system: Nothing done; plans submitted.  
 Sluice valves: Seven-tenths completed.  
 Sounding tubes: Nothing done.  
 Coal bunker fire alarm: Nothing done.  
 Water alarm: Nothing done.  
 Speaking tubes and telegraph: Nothing done.  
 Ceiling in hold: Nothing done.  
 Ward room: Five-tenths completed.  
 Junior officers' quarters: Five-tenths completed.  
 Cabin: Seven-tenths completed.  
 Chronometer and compass lockers: Nothing done.  
 Sail room: Built in hull, but nothing fitted.  
 General storeroom: Built in hull, but nothing fitted.  
 Paymaster's office: Nothing done.  
 Master-at-arms locker: Nothing done.  
 Signal locker: Nothing done.  
 Swinging tables, etc.: Nothing done.  
 Dispensary: Nothing done.  
 Engineer's workshop: Built, but nothing fitted.  
 Engineer's storeroom: Built, but nothing fitted.  
 Pantries: Nothing done.  
 Refrigerator room: Built, but nothing fitted.  
 Crew's water closet: Built, but nothing fitted.  
 Fireman's wash room: Built, but nothing fitted.  
 Lavatories for officers and crew: Built, but nothing fitted.  
 Reels: Nothing done.  
 Brass label plates: Nothing done.  
 Mess and clothes lockers: Nothing done.  
 Eyebolts in beams: Nothing done.  
 Lamp room: Built, but nothing fitted.  
 Oil tanks: Nothing done.  
 Cleaning, galvanizing and painting: Three-tenths completed.  
 Painting, graining, etc.: Nothing done.  
 Calking: Three-tenths completed.  
 Varnishing decks: Nothing done.  
 Figures for draft: Completed.  
 Cement: Eight-tenths completed.  
 Scuppers: Seven-tenths completed.  
 Electric call bells: Nothing done.  
 Installation of electric lights: Nothing done.  
 Grounding: Has not grounded as yet.  
 Testing water-tight compartments: Two-tenths completed.  
 Prison: Built, but nothing fitted.  
 Armory: Nothing done.

The percentage of work completed under the contract is about 80 per cent. In my opinion the ship can be made ready for contractor's trial trip in about five months (February 1, 1893), and for final delivery to the Government in about ten months (July 1, 1893).

The photographic views required with this report are forwarded the Bureau this day by Adams Express.

Very respectfully, your obedient servant,

JOHN B. HOOVER,  
*Naval Constructor, U. S. Navy,*  
*Superintending Constructor.*

Chief Constructor T. D. WILSON, U. S. Navy,  
*Chief of Bureau of Construction and Repair.*

OFFICE OF SUPERINTENDING CONSTRUCTOR,  
THE SAMUEL L. MOORE & SONS CO.,  
Elizabethport, N. J., August 26, 1892.

SIR: In obedience to the Bureau's No. 8750-92 of July 13, 1892, I have to submit the following report of the condition of work upon the steel practice vessel *Bancroft* at the present date:

Keel and keelson: Completed.  
Stem: Completed.  
Sternpost: Completed.  
Shaft tubes and struts: Completed.  
Rudder and stock: Completed.  
Transverse framing: Completed.  
Longitudinals, including breast hooks: Completed.  
Outside plating: Completed.  
Transverse metal bulkheads below water-tight deck: Completed.  
Transverse metal bulkheads above water-tight deck: Completed, except clamps, etc., to water-tight doors.  
Longitudinal metal bulkheads above water-tight deck: Completed.  
Longitudinal metal bulkheads below water-tight deck: Completed.  
Casings around engine hatches and uptakes: Completed.  
Hull work in engine space: Completed, except small fittings.  
Forecastle deck: Metal work and wood flat completed; hatches framed; skylight completed in shop; Lewis bolts in place; life rail being fitted; pin rail in place; eyebolts and miscellaneous fittings being installed.  
Poop deck: Metal work and wood flat completed; hatches framed; skylights completed; pin rails in place; booby hatch fitted; eyebolts and miscellaneous fittings being installed.  
Bridge: Completed.  
Main deck: Completed, except miscellaneous small fittings.  
Berth deck: Metal work and wood flat completed. Hatches framed and covers completed, except for magazines; miscellaneous fittings being installed.  
Water-tight deck: Completed, except installation of armor gratings.  
Platforms below water-tight deck: Completed.  
Flats and floors: Completed.  
Deck stanchions: Completed.  
Hatch, skylight, and coaling trunks: Completed, except coaling trunks.  
Hammock berthing: Completed.  
Cofferdams: Completed, except final painting and cementing; cellulose not received for packing.  
Metal sheathing and ceiling inside: Completed.  
Sponsons: Completed, except plates over manhole cover.  
Pumping, drainage, plumbing fittings: Main drain completed. Sluice and other valves completed, except deck plates. Small drain pipes to bunkers, store rooms, etc., nearly completed. Fire main, hand pumps, and plumbing work completed.  
Steering gear and fittings: Rudder completed. Tiller gear, completed. Steam steering engine installed. Hand steering wheel being installed. Steering standard and connections to steering engine completed in shop. Connections being run.  
Anchor gear and fittings: Completed, except hawse-pipe covers.  
Warping and towing gear: Completed.  
Water tanks and fittings: Completed.  
Air ports, deck lights, etc.: Completed.  
Torpedo tubes and ports: Forward shutter and gear being fitted. Cast steel tube forward completed. Hole cut for broadside torpedo tube and working drawings of shutter, tube, and gear being made.  
Boat davits, cradles, etc.: After davits fitted. Skid beams over quarter deck completed. Supports on rail for steam cutter and sailing launch completed. Steps and bails for davits being fitted. Davits all in yard and work in shops on gear well advanced.  
Awning stanchions: Plans completed.  
Hand rails and hatch canopy frames: Hand rails on upper decks completed; hatch canopies not begun.  
Wood ceiling and joiner work in officers' quarters: Completed.  
Wood ceiling and joiner work in cadets' quarters: Completed, except few minor jobs.  
Wood ceiling and joiner work in crews' quarters: Completed, except few minor jobs.  
Wood ceiling and joiner work in magazines: Completed.  
Wood ceiling and joiner work in store rooms: Completed, except few minor jobs.  
Paint, cement, sand, coke, etc.: Completed, except final coats and tonching up.  
Mast steps, partners, chain plates, and all fittings: Ready for stepping masts.

Miscellaneous fittings outside: Ash chutes and guards, life buoy guards, sea steps, mooring staples, and jack rods completed; other fittings in hand.

Ventilation fittings: Completed, with exception of running a few more pipes below and fitting ventilators above deck.

Water alarms: Circuits being run.

Means of interior communication: Speaking tubes, bell circuits, etc., being run.

Installation of electric light: Dynamo room and foundations nearly completed; most of the molding run and some fixtures in place; no wire received; dynamos and engines not received.

I estimate that 93 per cent of the hull work, including packing coffer dams and electric-light installation, is completed.

In my opinion and to the best of my judgment the steel practice vessel *Bancroft* should be ready for trial by October 15, 1892, and for final delivery by December 1, 1892.

Very respectfully, your obedient servant,

D. W. TAYLOR,  
*Naval Constructor, U. S. Navy,*  
*Superintending Constructor.*

Chief Constructor T. D. WILSON, *U. S. Navy,*  
*Chief of Bureau of Construction and Repair.*

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OFFICE OF SUPERINTENDING CONSTRUCTOR FOR U. S. NAVY,  
WM. CRAMP & SON, SHIP AND ENGINE BUILDING WORKS,  
*Philadelphia, August 18, 1892.*

SIR: In obedience to the Bureau's order No. 8750-92 of July 13, 1892, I have the honor to report below the condition of work to date upon the five United States naval vessels being built at these works under contract with the Wm. Cramp & Sons' Ship and Engine Building Company.

The photographs and negatives showing the various ships have been shipped to the Bureau.

#### U. S. BATTLE SHIP NO. 1, INDIANA.

Keel: Completed.

Stern: Completed.

Stern post: Completed.

Stern frame: Completed.

Transverse frames: Completed to berth deck in wake of armor belt; completed forward and aft of armor belt.

Outside plating: Completed to shelf in wake of armor belt; nearly completed to berth deck forward; nearly completed to protective deck aft.

Flat keelson plates: Completed.

Inner bottom: Completed, except man holes, etc.

Longitudinals: Completed.

Transverse water-tight bulkheads: Nearly completed below protective deck; commenced above protective deck forward.

Longitudinal bulkheads: Well advanced below armor and protective decks.

Ammunition passages: Completed except doors.

Water-tight doors: Well advanced.

Main deck beams: In place forward and abaft diagonal armor.

Berth deck frames: Nearly completed.

Protective deck beams: Completed.

Platform beams: Completed.

Deck plating, stringers, and tie plates, main deck: Commenced.

Berth deck: Well advanced.

Protective deck: Completed.

Platforms: Completed.

Magazines: Commenced.

Shell rooms: Commenced.

Fixed ammunition rooms: Commenced.

Ready service magazines: Commenced.

Passing scuttles: Commenced.

Cofferdams: Commenced.

Steering arrangements: Commenced in shop.

Chain lockers: Commenced.

Trimming tanks: Commenced.

Engine, boiler and shaft bearers: Commenced.

Drainage and pumping: Commenced.

Framing behind armor: Completed behind belt and diagonal armor.

Armor plating: Plates nearly secured on forward bulkhead; ready for going up on after.

Molds for belt armor and casemate armor: Finished.

Backing behind armor: Completed on forward bulkhead; nearly completed aft.

Supports for diagonal armor: Completed.

General and other store rooms: Angles commenced.

Shaft tubes and struts: Commenced.

Ordnance workshop: Commenced.

Painting: Being done as required by work.

About four-tenths of the hull work on this vessel is completed. It is estimated that she will be ready for the contractors' trial and for final delivery to the Government on the 1st day of November, 1893, and 15th day of February, 1894, respectively.

#### U. S. BATTLE SHIP NO. 2, MASSACHUSETTS.

Keel: Completed.

Stern: Completed.

Stern post: Completed.

Stern frame: Well advanced.

Transverse frames: Completed to berth deck in wake of armor belt; forward completed; aft completed to protective deck.

Outside plating: Completed in wake of belt to shelf; forward nearly completed to berth deck; aft nearly completed to protective deck.

Flat keelson plates: Completed.

Inner bottom: Completed, except manholes, etc.

Longitudinals: Completed.

Transverse water-tight bulkheads: Nearly completed below protective decks; commenced above, forward of diagonal armor.

Longitudinal bulkheads: Well advanced below armor and protective decks.

Ammunition passages: Completed, except doors, etc.

Water-tight doors: Well advanced.

Main deck beams: In place forward of diagonal armor.

Berth deck beams: Well advanced.

Protective deck beams: Completed.

Platform beams: Completed.

Deck plating, stringers, and tie plates: Main deck, commenced; berth deck, well advanced; protective deck, nearly completed; platforms, completed.

Magazines: Commenced.

Shell rooms: Commenced.

Fixed ammunition rooms: Commenced.

Ready-service magazine: Commenced.

Ordnance workshop: Commenced.

Passing scuttles: Commenced.

Cofferdams: Commenced.

Steering gear: Commenced in shop.

Chain lockers: Commenced.

Trimming tanks: Commenced.

Engine, boiler, and shaft-bearers: Commenced.

Drainage and pumping: Commenced.

Framing behind armor: Nearly completed behind belt and diagonal armor.

Supports to diagonal armor: Completed.

General and other storerooms: Commenced.

Shaft tubes and struts: Commenced.

Painting: Being done as required by work.

About thirty-five one-hundredths of the hull work on this vessel is completed. It is estimated that she will be ready for the contractor's trial and final delivery to the Government on the 1st day of December, 1893, and the 15th day of March, 1894, respectively.

#### U. S. ARMORED CRUISER No. 2, NEW YORK.

Keel: Completed.

Stern: Completed.

Stern post: Completed.

Stern frame: Completed.

Transverse frames: Completed.

Longitudinal frames: Completed.

Flat keelson plates: Completed.  
Longitudinals: Completed.  
Outside plating: Completed.  
Inner bottom: Completed.  
Deck beams: Completed.  
Bridge beams: Completed.  
Skid beams for boats: Completed.  
Coal bunker and other fore-and-aft bulkheads: Nearly completed.  
Deck plating, stringers, etc.: Completed.  
Plating to bridges: Well advanced.  
Transverse water-tight bulkheads: Nearly completed.  
Gutter on decks: Well advanced.  
Stanchions between decks and in hold: Completed.  
Engine, boiler, and shaft bearers: Engine bearers completed; boiler bearers ready for boilers.  
Shaft tubes and struts: Completed.  
Water-tight doors: Completed except trimmings.  
Armor on outside of hull plating: Partly received and fitting commenced.  
Armored barbettes and framing: Framing completed; wood backing of barbettes in place.  
Tubes to barbettes: Well advanced.  
Armor protection to 8-inch broadside guns; also to 4-inch guns and secondary battery: Molds made.  
Supports for 8-inch amidship guns: Completed.  
Tube and foundation of conning tower: Completed.  
Hatch coamings, skylights, and inclosures to same: Nearly completed.  
Cofferdams: Nearly completed, except packing.  
Bilge keels: Completed.  
Magazines: Nearly completed.  
Shell rooms: Nearly completed.  
Fixed ammunition rooms: Nearly completed.  
Torpedo manipulating rooms: Nearly completed.  
Passing scuttles: Commenced.  
Hammock berthing: Nearly completed.  
Coaling scuttles: Completed.  
Coaling chutes: Completed.  
Coal-chute plugs: Well advanced.  
Ash chute: Under way.  
Mast steps: Completed.  
Chain lockers: Completed.  
Scuppers: Nearly completed.  
Drainage and pumping: Well advanced.  
Plank sheers or water ways: Completed.  
Upper-deck plank: Nearly completed.  
Gun-deck plank: Completed, except at boiler hatch.  
Berth-deck plank: Completed, except at boiler hatch.  
Platform coverings: Completed.  
Water tanks: Nearly completed.  
Trimming tanks: Completed.  
Freeing ports: Well advanced.  
Mast partners: Completed.  
Refrigerating room: Completed.  
Prisons: Nearly completed.  
Firemen's wash rooms: Nearly completed.  
Lavatory for crew: Well advanced.  
W. C. and urinals for crew: Well advanced.  
Seatings for steering gear: Completed.  
Steering gear: Nearly completed.  
Chart house: Well advanced.  
Air ports: Completed.  
Ventilation: Nearly completed.  
Forced draft in fire rooms: Well advanced.  
Wood floor in coal bunkers: Completed.  
Ceiling in holds, store rooms, etc.: Completed.  
Sail and awning room: Well advanced.  
Ordnance workshop: Nearly completed.  
Engineer's workshop: Nearly completed.  
Engineer's log room: Completed.  
Engineer's store room: Nearly completed.  
Lamp room: Nearly completed.

Steam winches: Received and being fitted in place.  
 Windlass bed: Completed.  
 Windlass: Nearly completed.  
 Capstans: Nearly completed.  
 Deck pipes: Commenced.  
 Hawse pipes: Nearly completed.  
 Cable bitts: Completed.  
 Bow stoppers: Being fitted.  
 Bow chocks: Completed.  
 Warping or towing bitts: Completed.  
 Warping chocks: Completed.  
 Steel-wire cable nippers: Well advanced.  
 Anchor beds: Nearly completed.  
 Wardroom, junior and warrant officers' quarters: Nearly completed.  
 Cabins, state, and other rooms on gun deck: Nearly completed.  
 Lavatories for officers: Nearly completed.  
 W. C. and urinals for officers: Nearly completed.  
 Admiral's office: Nearly completed.  
 Captain's office: Nearly completed.  
 Executive officer's office: Nearly completed.  
 Navigator's office: Nearly completed.  
 Paymaster's office: Nearly completed.  
 Surgeon's examining room: Nearly completed.  
 Dispensary: Nearly completed.  
 Pantries: Nearly completed.  
 Galley beds, bulkheads, etc.: Commenced.  
 Band room: Commenced.  
 General and other store rooms: Well advanced.  
 Manhole scuttles: Commenced.  
 Sounding tubes: Nearly completed.  
 Armor gratings and covers to openings in protective deck: Nearly completed.  
 Gratings and hatch covers: Well advanced.  
 Ladders to hatches: Well advanced.  
 Iron rounds to ladders: Well advanced.  
 Sea steps: Well advanced.  
 Guard rails and stanchions: Commenced.  
 Swinging tables and benches for crew: Well advanced.  
 Hammock hooks: Commenced.  
 Awning stanchions: Commenced.  
 Mooring staples: Completed.  
 Dynamo room: Well advanced.  
 Voice pipes: Commenced.  
 Head ornament: Commenced.  
 Figures for draft of water: Completed.  
 Masts: Stepped.  
 Painting: Well advanced.  
 Cementing: Nearly completed.  
 Boats: Nearly completed.

About nine-tenths of the hull work on this vessel is completed. It is estimated that she will be ready for the contractor's trial February 1, 1893. The date of final delivery will depend upon the receipt of armor at the works. If it is all received by January 1, 1893, the *New York* should be ready for final delivery to the Government April 2, 1893.

#### UNITED STATES PROTECTED CRUISER NO. 12, COLUMBIA.

Keel: Completed.  
 Stern: Completed.  
 Stern post: Completed.  
 Stern frame: Completed.  
 Rudder: Completed.  
 Transverse frames: Completed.  
 Flat keelson plates: Completed.  
 Longitudinals: Completed.  
 Outside plating: Completed.  
 Inner bottom: Completed except manholes.  
 Deck beams: Completed.  
     beams: Completed.  
     beams for boats: Completed.  
 Fore and aft bulkheads: Nearly completed.

Deck plating, stringers, etc.: Completed.  
Transverse water-tight bulkheads: Nearly completed.  
Gutters on upper deck: Completed except cementing.  
Stanchions between decks: Completed.  
Stanchions in hold: Completed.  
Engine, boiler, and shaft bearers: Completed ready for machinery.  
Shaft tubes and struts: Completed.  
Water-tight doors: Nearly completed.  
Gun supports for 6-inch guns: Completed except doors.  
Conning tower foundation: Completed.  
Hatch coamings, skylights, and inclosures to same: Well advanced.  
Coffer dams: Well advanced.  
Bilge keels: Completed.  
Magazines: Nearly completed.  
Shell rooms: Nearly completed.  
Fixed ammunition rooms: Nearly completed.  
Torpedo manipulating rooms: Nearly completed.  
Hammock berthing: Well advanced.  
Coaling chutes: Under way.  
Chain lockers: Nearly completed.  
Scuppers: Completed.  
Drainage and pumping: Commenced.  
Plank sheers or waterways: Well advanced.  
Upper deck plank: Well advanced.  
Gun deck plank: Well advanced.  
Platform coverings: Well advanced.  
Water tanks: Well advanced.  
Trimming tanks: Completed.  
Freeing ports: Well advanced.  
Mast partners: Completed.  
Masts: Completed.  
Refrigerating rooms: Commenced.  
Prisons: Commenced.  
Water-closets and urinals for crew: Commenced.  
Seating for steering gear: Completed.  
Steering gear: Under way.  
Air ports: Well advanced.  
Ventilation: Under way.  
Forced draft in fire rooms: Commenced.  
Ordnance workshop: Commenced.  
Engineer's workshop: Commenced.  
Engineer's storeroom: Commenced.  
Oil tanks: Nearly completed.  
Windlass bed: Completed.  
Windlass: Nearly completed.  
Capstans: Well advanced.  
Deck pipes: Commenced.  
Hawse pipes: Nearly completed.  
Warping and towing bitts: Well advanced.  
Warping chocks: Well advanced.  
Boats: In hand.  
Wardroom, junior, and warrant officers' quarters: Joiner work under way in shops.  
Captains' cabins, staterooms, etc.: Joiner work under way in shops.  
Lavatories for officers: Joiner work under way in shops.  
Water closets and urinals for officers: Joiner work under way in shops.  
Captain's office: Under way.  
Executive officer's office: Joiner work commenced in shop.  
Paymaster's office: Joiner work commenced in shop.  
Dispensary: Joiner work commenced in shop.  
Panttries: Joiner work commenced in shop.  
Galley bed: Commenced.  
General and other store rooms: Under way.  
Manhole scuttles: Under way.  
Armor gratings and covers to openings in protective deck: Commenced.  
Gratings and hatch covers: Commenced.  
Mooring staples: Completed.  
Portable furniture: Commenced in joiner shop.  
Painting: Well advanced.  
Cementing: Well advanced.  
Figures for draft, completed.

About seven-tenths of the hull work on this vessel is completed. It is estimated that she will be ready for contractor's trial May 30, 1893, and for final delivery to the Government August 15, 1893.

## UNITED STATES PROTECTED CRUISER NO. 13.

Keel: Completed.  
 Stern: Well advanced.  
 Stern post: Completed.  
 Rudder: Forging made.  
 Transverse frames: Completed up to protective deck.  
 Flat keelson plates: Completed.  
 Longitudinals: Completed.  
 Outside plating: Well advanced below protective deck.  
 Inner bottom: Completed, except manholes, etc.  
 Protective deck beams: Completed.  
 Platform beams: Well advanced.  
 Coal bunker and other fore and aft bulkheads: Commenced below protective deck.  
 Deck plating, stringers, etc., on protective deck: Well advanced.  
 Platform plating: Well advanced.  
 Transverse water-tight bulkheads: Well advanced below protective deck.  
 Bilge keels: Commenced.  
 Magazines: Commenced.  
 Shell rooms: Commenced.  
 Fixed ammunition rooms: Commenced.  
 Chain lockers: Well advanced.  
 Painting: Commenced.

About two-tenths of the hull work on this vessel is completed. It is estimated that she will be ready for contractor's trial November 30, 1893, and for final delivery to the Government February 1, 1894.

Very respectfully, your obedient servant,

D. W. TAYLOR,

*Naval Constructor, U. S. Navy, in charge.*

Chief Constructor T. D. WILSON, U. S. Navy,  
*Chief of Bureau of Construction and Repair.*

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OFFICE OF SUPERINTENDING CONSTRUCTOR, U. S. NAVY,  
 COLUMBIAN IRON WORKS AND DRY DOCK COMPANY,  
*Baltimore, Md., August 17, 1892.*

SIR: In accordance with the directions given in Bureau's orders of the 13th ultimo, No. 8750-92, I submit herewith the following special report of the condition of work on United States cruiser No. 9, *Montgomery*.

## SPECIAL REPORT.

The following parts of this vessel I have to report as completed. Material (may practically be said to be all in the yard):

Vertical keel, flat keel, stem, stern post, stern frame, rudder, transverse frames, deck beams, beams to platform decks, half beams and carlings, girders, shaft tubes and struts, deck stringers and plating, berth deck stringers and plating, platforms, stanchions under poop and fore-castle decks, gutters on gun deck, freeing ports, skid beams for boats, water courses (limbers), longitudinals, flat keelson plates, outside plating, center-line bulkhead, transverse water-tight bulkheads, coal bunker and other fore and aft bulkheads, passage in coal bunker, water-tight deck, bilge keels, engine, boiler and shaft bearings, gun deck stringers and plating, breasthook, stanchions in hold, plank shears, portable coaling chutes, platforms for guns, mast partners, mast steps, deck lights, bow stoppers, windlass and capstan, warping bits, ring bolts in deck, bill boards, wood pilot house, water tanks, trunks to coal bunkers, wood floors in coal bunkers, shell rooms, passing scuttles, forced draft in fire rooms, ward rooms, general and store rooms, armory, dispensary, refrigerating machine room, scuppers, gun supports, windlass bed, life buoy guards, cofferdams, hawse pipes, manger, steel wire cable nippers, anchor davits, conning tower and shield for entrance to same, chain lockers, ash chutes, coal scuttles, magazines, fixed ammunition room, trimming tanks, ceiling in hold, sail room, paymaster's office, prisons, engineers' log room, etc., figures for draft of water.



The following is a report of the condition of work now in hand and nearly completed:

Water-tight doors: Almost completed.  
 Holes in bulkheads: Almost completed.  
 Machine gun and torpedo shutters: Almost completed.  
 Torpedo arrangements: Almost completed.  
 Hatch coaming and skylights: Almost completed.  
 Gratings and hatch covers: Almost completed.  
 Guard rail and stanchions: Almost completed.  
 Draining and pumping: Almost completed.  
 Ventilation: Mostly completed.  
 Signal locker: Mostly completed.  
 Water-closets: Mostly completed.  
 Swinging tables and benches: Finished, but not hung or stowed.  
 Engineers' stores: Not shelved.  
 Ordnance workshop: Not fitted up yet.  
 Fireman's washroom: Completed, except as to drainage.  
 Lavatories: Completed, except water supply and drainage, which is now being done.  
 Reels: Not yet made.  
 Brass label plates: Now being made (by subcontract).  
 Sluice valves: In ship, rods for working nearly made.  
 Sounding tubes: Now being put in ship.  
 Hammock hooks: Nearly all in place.  
 Bridges: Work progressing (about three-fourths done).  
 Air ports: All in ship, require testing of gaskets.  
 Ladders: All ladders are made, but not hung.  
 Awning stanchions: Material in yard; part are made.  
 Canopies: Are about one-half finished.  
 Hatch cranes: Not yet made.  
 Shot racks, etc.: Partly made.  
 Lashing bolts: Partly in.  
 Chocks for fair leaders: Mostly in place.  
 Pin rails: Partly made.  
 Lumber irons: Partly made.  
 Brass rubbing plates: Awaiting lead of ropes.  
 Running lights: Not made.  
 Swinging booms: Not made.  
 Ensign staff: Not made.  
 Watch bell: Finished; not hung.  
 Boat davits and cradles: The large davits have been forged and bent, but not machined. Quarter davits are having the hinged joint machined.  
 Galley house, bed, etc., house built and galley set up; paving not yet put down on floor.  
 Deck pipe: All complete except berth-deck stoppers.  
 Steering apparatus: Completed, except making connection between steering engine and pilot house and adjusting wheel in conning tower and pilot house.  
 Torpedo stowage: Not completed.  
 Junior officers' quarters: Completed, except as to upholstering.  
 Cabins under poop: Completed, except as to upholstering.  
 Chronometer and compass locker: Being built.  
 Brass label plates: Now being made by subcontract.  
 Mess and clothes lockers: Dispensed with.  
 Eye bolts in beams: Not yet in ship.  
 Lamp room: Not fitted up.  
 Oil tanks: Not yet built.  
 Cleaning, galvanizing, etc., and painting steel work: Has been done as the work progressed.  
 Painting, graining, and polishing woodwork: Has been completed as far as can be until ship is complete.  
 Calking: Has been done as the work progressed.  
 Cement: The bilges and corners liable to corrode have been cemented, as far as work would permit.  
 The following-named work under an equipment officer is now being put in the ship and will be finished as soon as other parts of the ship:  
 Coal bunker fire alarms, speaking tubes and telegraphs, installation of electric lights, water alarms, electric call bells.  
 The following-named work is advanced, as far as can be, until the sponson armor is in place.  
 Plank sheers or water ways; hammock berthing; sponsons for guns; deck plank; attachments for rigging.

Three "broadside" sponson armor plates have arrived and are in position on this ship.

Testings: The compartments (except coal bunkers below water-tight deck) have all been tested and found perfect as to water-tightness.

#### THE QUALITY OF MATERIAL AND WORKMANSHIP.

The material used in the construction of this vessel has been good. The workmanship is good and has been performed in a careful and workmanlike manner.

Percentage of finished work.

I estimate that 93 per cent of the work on the hull and fittings under the contract has been and is completed.

It is my opinion that Cruiser No. 9, *The Montgomery*, will be able to go on her official trial trip, on or about February 1, 1893, and that it will then take about one month to finish painting and cleaning and putting the vessel in order for the acceptance of the Government, which latter event I would place at about the 1st day of March, 1893. Photographs showing the present condition of this vessel accompany this report.

Very respectfully,

WM. H. VARNEY, U. S. Navy,

*Superintending Constructor, Cruiser No. 9, Montgomery.*

Chief Constructor T. D. WILSON, U. S. Navy,

*Navy Department, Washington, D. C.*

OFFICE OF SUPERINTENDING CONSTRUCTOR, U. S. NAVY,  
COLUMBIAN IRON WORKS AND DRY DOCK COMPANY,  
*Baltimore, Md., August 17, 1892.*

SIR: In accordance with the directions given in Bureau's orders of the 13th ultimo, No. 8750-92, I submit herewith the following special report of the condition of work on United States cruiser No. 10, *Detroit*:

#### SPECIAL REPORT.

The following parts of this vessel I have to report as completed. Material (may practically be said to be all in the yard):

Vertical keel, flat keel, stem, stern post, stern frame, rudder, transverse frames, deck beams, beams to platform decks, half beams and carlings, girders, shaft tubes and struts, deck stringers and plating, berth-deck stringers and plating, platforms, stanchions under poop and forecandle decks, gutters on gun deck, freeing ports, skid beams for boats, water courses (limbers), longitudinals, flat keelson plates, outside plating, center-line bulkhead, transverse water-tight bulkheads, coal bunker and other F and A bulkheads, passage in coal bunker, water-tight deck, bilge keels, engine, boiler, and shaft bearers, gun-deck stringers and plating, breast hook, stanchions in hold, decks, plank shears, portable coaling chutes, platforms for guns, mast partners, mast steps, deck lights, bow stoppers, windlass and capstan, warping bitts, ring bolts in deck, bill boards, wood pilot house, water tanks, trunks to coal bunkers, wood floors in coal bunkers, shell rooms, passing scuttles, forced draft in fire-rooms, ward rooms, general and store rooms, armory, dispensary, refrigerating machine room, scuppers, gun supports, windlass bed, life-buoy guards, cofferdams, hawse pipes, manger, steel wire cable nippers, anchor davits, conning tower and shield for entrance to same, chain lockers, ash chutes, coal scuttles, magazines, fixed ammunition room, trimming tanks, ceiling in hold, sail room, paymaster's office, prisons, engineer's log room, etc., figures for draft of water.

The following is a report of the condition of work now in hand and nearly completed:

Water-tight doors: Almost completed.  
Holes in bulkheads: Almost completed.  
Machine gun and torpedo shutters: Almost completed.  
Torpedo arrangements: Almost completed.  
Hatch coamings and skylights: Almost completed.  
Gratings and hatch covers: Almost completed.  
Guard rail and stanchions: Almost completed.  
Draining and pumping: Almost completed.  
Ventilation: Almost completed.  
Signal locker: Almost completed.  
Water-closets: Almost completed.

Swinging tables and benches: Finished, but not hung or stowed.  
 Engineers' stores: Not shelved.  
 Ordnance workshop: Not fitted up yet.  
 Fireman's wash room: Completed except as to drainage.  
 Lavatories: Complete, except water supply and drainage, which is now being done.  
 Reels: Not yet made.  
 Brass label plates: Now being made (by subcontract.)  
 Sluice valves: In ship, rods for working nearly made.  
 Sounding tubes: Now being put in ship.  
 Hammock hooks: Nearly all in place.  
 Bridges: Work progressing (about three-fourths done).  
 Air ports: All in ship require testing of gaskets.  
 Ladders: All ladders are made but not hung.  
 Awning stanchions: Material in yard; part are made.  
 Canopies: Are about one-half finished.  
 Hatch cranes: Not yet made.  
 Shot racks, etc.: Partly made.  
 Lashing bolts: Partly in.  
 Chocks for fair leaders: Mostly in place.  
 Pin rails: Partly made.  
 Lumber irons: Partly made.  
 Brass rubbing plates: Awaiting lead of ropes.  
 Running lights: Not made.  
 Swinging booms: Not made.  
 Ensign staff: Not made.  
 Watch bell: Finished, not hung.  
 Boat davits and cradles: The large davits have been forged and bent, but not machined. Quarter davits are having the hinged joint machined.  
 Galley house, bed, etc.: House built and galley set up. Paving not yet put down on floor.  
 Deck pipe: All complete except berth-deck stoppers.  
 Steering apparatus: Completed except making connection between steering engine and pilot house and adjusting wheel in conning tower and pilot house.  
 Torpedo stowage: Not completed.  
 Junior officers' quarters: Completed except as to upholstering.  
 Cabins under poop: Completed except as to upholstering.  
 Chronometer and compass locker: Being built.  
 Brass label plates: Now being made by subcontract.  
 Mess and clothes lockers: Dispensed with.  
 Eyebolts in beams: Not yet in ship.  
 Lamp room: Not fitted up.  
 Oil tanks: Not yet built.  
 Cleaning, galvanizing, etc., and painting steelwork: Has been done as the work progressed.  
 Painting, graining, and polishing woodwork: Has been completed as far as can be until ship is complete.  
 Calking: Has been done as the work progressed.  
 Cement: The bilges and corners liable to corrode have been cemented as far as work would permit.  
 The following-named work under an equipment officer is now being put in the ship, and will be finished as soon as other parts of the ship:  
 Coal-bunker fire alarms, speaking tubes and telegraphs, installation of electric lights, water alarms, electric call bells.  
 The following-named work is advanced as far as can be until the sponson armor is in place:  
 Plank shears or waterways, hammock berthing, sponsons for guns, deck plank, attachments for rigging.  
 Three "broadside" sponson armor plates have arrived and are in position on this ship.  
 Testings: The compartments (except coal bunkers below water-tight deck) have all been tested and found perfect as to water-tightness.

#### THE QUALITY OF MATERIAL AND WORKMANSHIP.

The material used in the construction of this vessel has been good. The workmanship is good and has been performed in a careful and workmanlike manner.

#### PERCENTAGE OF FINISHED WORK.

I estimate that 93 per cent of the work on the hull and fittings under the contract has been completed.

I am of the opinion that cruiser No. 10, the *Detroit*, will be able to go on her official trial trip January 1, 1893, and that it will require a month to finish painting, cleaning, and putting the ship in order to turn over for the acceptance of the Government, which will make the last-named event take place on or about February 1, 1893. Photographs showing present condition of this vessel accompany this report.

Very respectfully,

W. H. VARNY, U. S. NAVY,

*Superintending Constructor, Cruiser No. 10, Detroit.*

Chief Constructor T. D. WILSON, U. S. NAVY,

*Navy Department, Washington, D. C.*

OFFICE OF SUPERINTENDING CONSTRUCTOR FOR U. S. NAVY,

IOWA IRON WORKS,

*Dubuque, Iowa, July 16, 1892.*

SIR: In obedience to the Bureau's order dated July 13, 1892, No. 8750-92, I have the honor to submit the following report of the condition of the work on torpedo boat No. 2, together with a statement of the total percentage of work completed under the contract and the probable date when it is estimated that the boat will be ready for final delivery to the Government:

**Material:** Practically all of the material for the construction of the hull is on hand with the exception of the steel forging for the rudder frame and stock, the stern tubes and shaft struts.

**Flat keel plates:** All shaped, sheared, galvanized, planed, and punched, but rivet holes not yet countersunk.

**Vertical keel:** Completed.

**Stem:** About two-thirds completed.

**Sternpost:** Nearly completed.

**Stuffing box and rudder bearer:** Patterns made.

**Rudder:** Composition sleeve cast and patterns made for carrier; patterns made and steel castings ordered for quadrant and bearer.

**Transverse frames, including deck beams, floors, etc.:** Completed.

**Deck plating:** Middle strake sheared, punched, and planed; all other strakes shaped.

**Turtle-back deck:** Six plates bent to shape; three of them planed and punched.

**Outside plating:** A, B, C, D, and L strakes galvanized and scraped smooth.

**Fore and aft bulkheads:** All vertical stiffeners rivetted to the completed frames; connections to bottom plating shaped.

**Transverse water-tight bulkheads:** Completed except on No. 4 and No. 11 frames.

I estimate that 32 per cent of the hull work has been completed to date.

To the best of my judgment, and notwithstanding that about 77 per cent of the contract time has expired and that the keel has not yet been laid, still I am of the opinion that if the contractors handle the work with a reasonable amount of energy it will, I think, be quite possible to complete the hull before navigation closes, about the 1st of December, and be ready for her trial within a month after her arrival at Pensacola, or about February 1, 1893, allowing one month to reach Pensacola.

But if the work progresses in the future as it has in the past the boat will probably be completed about April 1, 1893, and will be ready for her trial about a month after her arrival at Pensacola, or about June 1, 1893, allowing a month to reach Pensacola.

Very respectfully, your obedient servant,

LEOYD BARNESON,

*Assistant Naval Constructor, U. S. Navy, Superintending Constructor.*

THE CHIEF OF BUREAU OF CONSTRUCTION AND REPAIR,

*Navy Department, Washington, D. C.*

OFFICE OF NAVAL CONSTRUCTION

SUPERINTENDING HULLS OF VESSELS U. S. NAVY.

IOWA IRON WORKS,

*San Francisco, Cal., August 1, 1892.*

SIR: In obedience with Bureau's order No. 8750-92, of July 13, 1892, I have the honor to submit the following report of the condition of work on the hull of Cruiser No. 2.

**Flat keel plates:** Inner and outer plates completed.

**Center vertical keel:** Completed.

**Stem:** Two lower pieces completed in place and riveted up to keel and outer plating the upper piece is in machine shop being tooled and drilled.

**Stern post:** Completed and in place.

**Stern framing:** Completed below protective deck, and counter casting for receiving end of protective deck completed and in place.

**Rudder:** Frame being cast.

**Transverse frames:** Below protective deck completed.

**Transverse frames:** Above protective deck completed from forward as far as frame No. 77.

**Flat keelson plate:** Completed.

**Longitudinals:** Completed.

**Shell plating:** Completed below protective deck, with the exception of a few plates aft to be put in place and riveted; above protective deck, about 50 plates in place but not riveted.

**Main deck beams:** Completed from forward to frame No. 77.

**Berth deck beams:** Completed from forward to frame No. 77.

**Protective deck beams:** Completed and in place fore and aft.

**Platform deck beams:** Completed.

**Half beams and carlings:** Completed on all decks where beams are in place.

**Coal bunker and other longitudinal bulkheads below protective deck:** Completed, except coal doors to bunkers and water-tight doors to compartments.

**Main deck plating and stringers:** Stringer plates in place frames No. 8 to No. 60; deck plating, about 40 plates in place.

**Berth deck plating and stringers:** Stringer plates in place frames No. 10 to No. 58; deck plating, about 30 plates in place.

**Platform plating:** Completed, except hatches and scuttles.

**Transverse W. T. bulkheads:** Below protective deck, all in place and riveted, except those between fire and engine rooms.

**Transverse W. T. bulkheads:** Above protective deck, bulkheads on frames Nos. 5, 11, 14, 19, 22, 26, 28, 33, 38, 42, 46, 50, 54, 59, 64, 67, have two-thirds of their respective plates in place.

**Stanchions between decks:** Forging of heads and heels completed ready for welding as soon as correct lengths are taken from work.

**Engine, boilers, and shaft-bearers:** Completed in engine-rooms, are fitted in place, and greater part riveted in boiler-rooms.

**Shaft tubes and struts:** In place ready for riveting.

**Watertight doors and fittings:** Completed in shop, ready to be fitted and hung in place.

**Glacia plates to engine hatches:** Being fitted in place.

**Hatch-coamings and skylights:** Coamings for protective deck hatches being fitted in place; skylight fittings, etc., are completed.

**Cofferdams:** Angle in protective deck for fore and aft vertical bulkhead in place, material cut for vertical bulkhead and top, for cofferdam proper.

**Bilge keels:** Plates being laid off, and angles being fitted to shell plating.

**Ammunition lifts:** Compartments completed, but not placed.

**Magazines, shell rooms, and fixed ammunition rooms:** All bulkheads forming these compartments are in place and riveted.

**Ammunition passing scuttles:** Completed in shop; in readiness to be fitted in vessel.

**Coal scuttles in decks:** Completed in shop.

**Coal chutes:** Plugs in protective deck completed in shop.

**Coal chutes:** Opening in berth deck plate cut and border angle in place; material cut for chute proper.

**Scuppers:** Castings all completed in shop.

**Hand pumps:** In shop ready to be fitted in place.

**Drainage:** Completed in double bottom; all other pipes and valves completed in shop ready to connect as soon as other work is sufficiently advanced to go ahead.

**Plank sheers or water ways:** Material in the yard ready for use.

**Deck planking:** Plank seasoning in the yard ready for use.

**Water tanks:** Stationary fresh-water tanks, between protective deck and berth deck; protective deck plating, which forms the bottom of these tanks, has been calked and made thoroughly watertight.

**Trimming tanks:** Completed, except cementing.

**Mast partners:** Deck plating and framing ready for same.

**Steering gear:** Seating completed in place and gear on ship ready to be put in place.

**Ventilation:** All automatic valves below protective deck completed in shop; all brass castings and valves for piping completed in shop.

**Forced draft in fire room:** Inclosures for fans completed in place ready for riveting; fans in shop well on to completion.

**Water courses:** All cut in transverse and longitudinal frames; sluice gates and valves completed for same.

Engineer's store rooms: Bulkheads inclosing these compartments completed and in place.

Windlass: Completed in shop ready to go in place.

Capstan: Component parts nearly completed in shop and ready to be put together.

Cable bits: Completed in shop.

Bow chain stoppers: Completed in shop.

Warping or towing bits: Completed in shop.

Warping chocks: Completed in shops.

Steel wire cable nippers: Completed in shop.

Anchor davits: Completed in shop.

Boat davits and boat cradles: Forgings being made in shop.

Manholes in double bottom, etc.: Majority in place in double bottom, and balance completed, ready to go in place.

Armor gratings and covers to protective deck: Coal chute covers completed in shop; gratings well advanced in shop.

Hatch canopies: Brass canopy stanchions for after hatches completed in shop.

Side ladders: All iron work completed in shop.

Guard rails and awning stanchions: Completed in shop.

Reels: Wire hawser reels completed in shop.

Ship's bell: Completed in shop.

Awning stanchions: two-thirds completed in shop.

Mooring staples: Completed in shop, ready to go in place.

Electric light: Engines completed in shop.

Swinging booms: All forged work completed and ready to go in place.

Ensign staff: Completed and ready to go in place.

Calking: Shell plating well along below protective deck; inner bottom; water-tight frames; crank pits, and all under engines, completed.

The following is the material actually worked into hull of the ship on stocks:

	Weight.
Plate .....	2,435,931
Angle .....	292,471
Buttstraps .....	27,921
Liners .....	16,487
Beams .....	200,654
Z. Bars .....	83,832
Wrought steel .....	99
Cast steel .....	65,385
Wrought iron .....	11,985
Cast iron .....	10,141
Brass .....	6,345
Rivets .....	99,305
Paints .....	10,519
Tobin's metal .....	887
Total pounds .....	3,261,962
Total tons .....	1,456.23

I estimate the work on the vessel about 50 per cent completed.

It is estimated that Cruiser No. 6 will be ready for launching by December 1, 1892, and for contractor's trial by June 1, 1893.

Photographs of this vessel are being taken and, with their negatives, will shortly be forwarded to Bureau.

Very respectfully,

R. W. STEELE,

*Naval Constructor, U. S. Navy, Superintending Constructor.*

Chief Constructor T. D. WILSON, U. S. Navy,

*Chief of Bureau of Construction and Repair,*

*Navy Department, Washington, D. C.*

OFFICE OF NAVAL CONSTRUCTOR, U. S. NAVY,  
SUPERINTENDING HULL OF VESSELS, UNION IRON WORKS,  
*San Francisco, Cal., July 25, 1892.*

SIR: In compliance with Bureau's order, No. 8750-92, of July 13, I honor to transmit the following report of the condition of work on the armored coast defense vessel *Monterey*.  
Vertical keel: Completed.  
Flat keel: Completed.

Armor shelf: Completed.  
Stem: Completed.  
Stern-post: Completed.  
Rudder: Completed.  
Shaft tubes and struts: Completed.  
Transverse frames: Completed.  
Longitudinals: Completed.  
Superstructure deck: Completed, except that portion around conning tower; the seams to be hardened down and an additional thread of oakum driven and seams puttied.  
Main deck: Completed, except around hawse pipe; forward seams require hardening down and additional thread of oakum driven and seams pitched.  
Berth deck: Completed, except in wing passages; gratings not yet made.  
Skid beams: Completed, except boat cradles and their appurtenances.  
Outside plating: Completed.  
Flat keelson: Completed.  
Inner bottom: Completed.  
Engine boilers and shaft bearers: Completed.  
Main deck plating: Completed.  
Hammock berthing: Completed, except bottom boards.  
Berth deck stringers: Completed.  
Transverse watertight bulkheads: Completed.  
Coal bunkers and other fore and aft bulkheads: Completed.  
Shaft alley: Completed.  
Watertight doors and sluice valves: Completed.  
Sounding tubes: Completed.  
Chain lockers: Completed.  
Stanchions in hold and 'tween decks: Completed.  
Magazines and shell rooms: Completed.  
Ammunition carriers: Patterns being made.  
Handling rooms: Bulkheads only completed.  
Loading trunks: Nothing done.  
Fixed ammunition room: Completed.  
Plank sheer: Completed, removed to secure armor plates.  
Belt armor: All plates fitted and being secured on starboard, and all plates but one on port side; this last plate not yet received.  
Armor bolts: Received and one-third in place.  
Turrets: Barbette armor received and being fitted in place.  
Turret armor: Not made, awaiting decision of Plans by Ordnance Bureau.  
Conning tower: Armor not yet received.  
Armored smoke pipe: Received and being fitted in place.  
Wood backing for belt armor plates: All completed.  
Ceiling in hold and storerooms: Completed.  
Ward room: Completed, except fitting wood panel work in dining room.  
Cabin: Completed.  
Steerage: Completed, except fitting berths, settees, and lockers.  
Warrant officers' quarters: Completed, except fore and aft bulkhead.  
Chronometer and compass lockers: Nothing done.  
Sail or awning room: Completed.  
Store rooms: Completed.  
Paymaster's office: Completed, except fore and aft bulkhead.  
Captain's office: Completed, except fore and aft bulkhead.  
Executive officer's office: Completed, except fore and aft bulkhead.  
Navigator's office: Nothing done.  
Armory: Completed, except door.  
Sick bay: Completed.  
Dispensary: Completed.  
Prison: Completed.  
Master-at-arms locker: Nothing done.  
Signal chest: Completed.  
Engineer's and ordnance workshop: Completed, except fore and aft bulkhead.  
Engineer's log room: Nothing done.  
Pantries: Completed.  
Water closets: Completed, except wood top to bowls and fore and aft bulkheads.  
Bath rooms: Completed.  
Lavatory for steerage: Completed.  
Galley inclosure: The deck is tiled and thwartship bulkhead in place, but none of inside fittings are in place.  
Lavatory for crew: Completed, except fore and aft bulkhead.  
Firemen's wash room: Completed, except fitting the lockers in place.  
Mess tables and benches for crew: Completed.  
Mess and clothes lockers of wire: Completed.

Lamp room: Nothing done.  
 Hatch coamings and skylights: Completed.  
 Gratings and hatch covers: Completed.  
 Rubbing plates: Nothing done.  
 Awning and life-line stanchions: Completed; to be replaced after side armor is secured.  
 Hand rails and stanchions: Completed.  
 Hatch cranes: Completed, except ammunition cranes.  
 Brass label plates on sea cocks, sluice valves and sounding tubes: Completed, others nothing done.  
 Shot racks and musket racks: Nothing done.  
 Lumber irons: Nothing done.  
 Reels for steel wire hawsers: In place.  
 Reels for hose: Nothing done.  
 Running lights: Nothing done.  
 Ship's bell: Completed.  
 Deck lights: Completed.  
 Coal scuttles: Completed.  
 Water tanks: Completed.  
 Chain stoppers: Completed.  
 Hawse pipes: Completed.  
 Bill boards: Completed.  
 Mooring bits: Completed.  
 Warping chocks: Completed.  
 Military mast: Completed, except riveting half round bead on military top.  
 Mast step: Completed.  
 Ring bolts in deck for securing anchors and other bolts about deck: Nothing done.  
 Store room ladders: Completed.  
 Companion way ladders: Completed.  
 Hammock hooks: Completed.  
 Hammock berthing: Completed, except covering the angle and bottom with wood.  
 Eyebolts in beams: Completed.  
 Oil tanks: Completed.  
 Canopies: Completed.  
 Swinging booms for boats: Nothing done.  
 Signal and ensign staffs: Completed.  
 Boats: Hulls of all boats except dinghy completed except puttying and last coat of paint; dinghy nothing done.  
 Boat davits and cranes: Completed.  
 Boat cradles: Completed in shop.  
 Anchor davits: Completed except fitting lowering device.  
 Steam capstan, windlass, and winch: Completed.  
 Windlass bed: Completed.  
 Steering apparatus: Completed except wire ropes and appliances in pilot-house and conning tower.  
 Speaking tubes and telegraphs: Partially completed.  
 Drainage and pumping arrangements: Completed.  
 Pumps: Hand pumps fitted except galvanizing the brakes.  
 Ventilation: Completed.  
 Ventilation of coal bunkers: Completed.  
 Fresh air supply to bunkers furnished by forced draft system: Completed.  
 Forced draft in fire room: Completed.  
 Electric lighting about completed except search-light connections.  
 Portable furniture: Completed except cabin sideboard and desk.  
 Cooperage: Completed.  
 Miscellaneous outfit: Nothing done except blocks, which are completed.  
 Figures for draft of water: Not completed.  
 Heeling ship: Not done.  
 Caulking: Completed except last thread in main and superstructure decks.  
 Cementing: Completed except very little in the ends of hammock berthing.  
 The time of completion of the *Monterey* depends entirely upon the receipt of the material furnished by the Government.  
 It is estimated that the work on this vessel is 95 per cent completed.  
 Photographs are being taken, and with their negatives will shortly be forwarded to the Bureau.

Very respectfully,

R. W. STEELE,

*Naval Constructor, U. S. Navy, Superintending Constructor.*

Chief Constructor T. D. WILSON, U. S. Navy,  
 Chief of Bureau of Construction and Repair,  
 Navy Department, Washington, D. C.



OFFICE OF NAVAL CONSTRUCTOR, U. S. NAVY,  
SUPERINTENDING HULLS OF VESSELS,  
UNION IRON WORKS,

*San Francisco, Cal., July 25, 1892.*

SIR: In compliance with Bureau's order No. 8750-92, of July 13, 1892, I have the honor to transmit the following report of the condition of work on the hull of battle ship No. 3, *Oregon*.

Vertical keel: Erected in place and riveted up from frame No. 7 to stern casting. Flat keel: Erected in place from frame No. 5 to frame No. 83, and riveted to vertical keel from frame No. 10 to frame No. 77.

Stern: Lower section being drilled in shop in readiness to be placed in position.

Stern post: Lower sections in shop being drilled for outside plate rivets.

Rudder: Stock forged and rough turned, the frame for backing-plates forged, and being prepared to weld to stock.

Transverse frames: Completed in place from No. 5 to No. 83, inclusive, below protective deck.

Outside plating: Nothing done; all material in the yard.

Flat keelson plates: In place from bulkhead No. 9 to bulkhead No. 78, except in wake of engine bed, and riveted, except one plate forward.

Inner bottom: In place except one strake on each side, and in wake of the engine bed; six strakes on each side riveted up between No. 22 and No. 51, two strakes on each side between frames No. 67 and No. 78, and all between frames No. 18 and No. 22, balance of material being laid off.

First longitudinal: In place from No. 19 to after end; riveted from No. 19 to No. 54.

Second longitudinal: In place from No. 18 to after end; riveted from No. 19 to No. 50.

Third longitudinal: In place from No. 18 to after end; riveted from No. 19 to No. 50.

Fourth longitudinal: In place from No. 18 to after end; riveted from No. 23 to No. 54.

Fifth longitudinal: In place from No. 22 to after end, riveted from No. 22 to after end.

Sixth longitudinal or armor shelf: In place in wake of belt armor between frames No. 26 and No. 70, but not yet riveted up.

Transverse water-tight bulkheads: Nos. 9, 14, 18, 22, and 78, below protective decks, are all in place, but not riveted.

Water-tight doors: All castings for door frames are completed and being fitted in shop. The following numbers are finished and ready for plating: 46, 2 feet by 5 feet 6 inches; 12, 2 feet by 5 feet 3 inches; 4, 2 feet 6 inches by 5 feet 6 inches; 6, 2 feet 4 inches by 5 feet 6 inches; 10, 1 foot 9 inches by 5 feet; 8, 1 foot 6 inches by 5 feet 6 inches; 4, 1 foot 6 inches by 5 feet 3 inches; 2, 1 foot 6 inches by 5 feet; 4, 1 foot 4 inches by 5 feet 6 inches; 1, 1 foot 4 inches by 4 feet 9 inches; all hinged doors. There are also fourteen sliding doors finished; the balance are all cast and being fitted in shop; all levers and fastenings for hinged and sliding doors are made and being fitted in shop.

Deck beams: The material for all beams has been received in the yard.

Berth-deck beams: There are 9 in place and 52 on the ground ready to be placed in their proper places.

Protective-deck beams: In place forward from frames No. 5 to No. 21 inclusive; in place aft from No. 72 to No. 82.

Platform-deck beams: In place forward from No. 10 to No. 13, No. 19 to No. 21, and between No. 22 and No. 29 there are 3 in place; the others are on the ground ready to be put in place; aft there are in place 6, from No. 72 to No. 77, inclusive.

Deck plating, stringers, and tie plates: All material has been received in the yard for all decks.

Protective deck at ends of ship: The following work has been done on the plating for this deck: 87 plates have been planed all around and 113 plates have been planed on two edges and one end.

Platform and hold plating: The deck between bulkheads No. 9 and No. 14 is in place, but not riveted; the material for the rest has been received in the yard.

Magazines: Between bulkheads Nos. 18 and 22 all the bounding angles below platform deck are in place and one longitudinal bulkhead is in place, not riveted; also bottom angle from passing room abaft of bulkhead No. 22 is in place; castings for hatches made and being fitted in shop.

Shell rooms and fixed ammunition rooms: Bottom angles and transverse bulkhead between 8-inch shell room and fixed-ammunition room, under platform deck, forward, in place, but not riveted.

Steering arrangements: All castings and forgings finished; gear wheels cut; cylinder completed, and work being put together in shop.

Boat cranes: Bed pieces and all castings and fittings for lower end of both cranes completed in shop; all castings and forgings for both trolleys finished and being fitted in shop; also pistons and cylinder heads for hoisting engines being fitted in shop.

Trimming tanks: Longitudinal bulkhead between No. 78 and No. 83 is in place, but not riveted; 2 Kingston valves and 4 deck indicators complete in shop.

Air ports: All castings are completed; twenty-five have been fitted in readiness to receive the glass; balance are being fitted in shop.

Steam winches: The following castings have been completed and are being fitted in shop: 4 bed-plates, 4 drums, 4 worm wheels, and all cylinders, crank shafts, and worms for 4 are finished; all cylinders are bored and fitted.

Drainage and pumping: All wrought-iron pipe has been received in the yard, and the following fittings are finished preparatory to being put in place: 12 sections of cast-iron pipe for main drain; 3 cast-iron sleeves for 8-inch, 1 for 6-inch, and 28 for 4-inch; 17 McComb strainers and 30 elbows for 4-inch drain; 23 wrought-iron flanges for 8-inch pipe, 79 for 6-inch pipe, and 123 for 4-inch pipe; 4 non-return valves for main drain, the other two cast and being fitted in shop; 7 6-inch angle-drain stop valves; 4 3-inch plug valves; 46 plug valves, 2½-inch straight-outlet; and 20 plug valves, 2½-inch angle-outlet, for platform and protective deck, with stem sockets and strainers for same; 14 4-inch drain valves for coal bunkers; 14 magazine-outlet valves; 4 3-inch plug valves and 43 sluice gates for fourth longitudinal. There are also 6 deck indicators for nonreturn valves, and 66 for platform and protective-deck valves.

Framing behind armor: There are 4 plates on each side in place, the balance of the plating being fitted and punched; all main-frame, intermediate-frame, and reinforce plates ready to go in place; 24 of the main-frame plates are in position; all necessary angles fitted ready to go in place; all intermediate bracket frames under armor shelf are in place; no riveting done on this work.

Shaft tubes and struts: One strut in shop being fitted and drilled; the other has been condemned, having developed imperfections in working.

Watch bell: Completed in shop.

Cleaning and painting steel and iron work: All main frames, vertical and flat keel inside, as far as completed, has received one coat of paint.

Manhole scuttles: Being cut in inner plating; the castings or covers have been completed and are being fitted in shop.

The following is the material actually worked into hull of the ship on stocks:

Material.	Weight.
Plate .....	610, 784
Angle .....	221, 331
Buttstraps .....	14, 766
Liners .....	5, 729
Beams .....	58, 644
X bars .....	15, 970
Rivets .....	22, 255
Paints .....	3, 561
Total pounds .....	953, 040
Tons .....	425. 46

I estimate the work on the hull about 20 per cent completed.

It is estimated that the *Oregon* will be ready for launching by May, 1893, and for contractors' trial by December, 1893.

Photographs of this vessel are being taken, and, with their negatives, will shortly be forwarded to the Bureau.

Yours, respectfully,

R. W. STEELE,

Naval Constructor, U. S. Navy, Superintending Constructor.

CHIEF OF BUREAU OF CONSTRUCTION AND REPAIR,  
Navy Department, Washington, D.C.

## APPENDIX H.

## REPORTS RELATIVE TO NECESSARY IMPROVEMENTS OF NAVY-YARD PLANTS.

UNITED STATES NAVY-YARD, PORTSMOUTH, N. H.,  
*Commandant's Office, September 14, 1892.*

SIR: Inclosed, for the action of the Bureau, please find a letter from Naval Constructor Hoover, recommending the purchase of certain named tools for perfecting the new steel plant at this yard.

The matter meets with my approval.

Very respectfully,

C. C. CARPENTER,  
*Captain, U. S. Navy, Commandant.*

The CHIEF OF BUREAU OF CONSTRUCTION AND REPAIR,  
*Navy Department, Washington, D. C.*

NAVAL CONSTRUCTOR'S OFFICE,  
*U. S. Navy-yard, Portsmouth, N. H., September 14, 1892.*

SIR: In compliance with the Bureau's letter, No. 9678-92, of date August 2, 1892, relative to the purchase of new tools, to enable work to be performed more economically and promptly upon the new steel vessels, I have to suggest that the following additional new tools be purchased for the different departments, viz:

## JOINER'S DEPARTMENT.

1 automatic knife grinding machine, complete and ready for use ..... \$115.00

## BLACKSMITH'S DEPARTMENT.

1 compressor for straightening or bending cold iron, ready for use..... 200.00  
 1 grindstone, ready for use ..... 45.00

## SHIP-FITTER'S DEPARTMENT.

1 screw-cutting lathe, ready for use ..... 1,100.00  
 1 drilling lathe, ready for use ..... 225.00  
 1 planer, ready for use ..... 1,650.00  
 1 arbor lathe for brass work, ready for use..... 600.00  
 1 turn-table turret lathe, fully equipped..... 1,300.00  
 1 geometric drill attachment (to drill square hole)..... 185.00  
 1 geometric drill attachment (to drill hexagonal hole) ..... 185.00  
 1 geometric drill attachment (to drill oval hole)..... 250.00  
 1 safety drill and tap-holder No. 1 ..... 357.00  
 1 safety drill No. 2 ..... 60.00

## BOAT-BUILDER'S DEPARTMENT.

1 pony planer, ready for use..... 200.00

Total estimated cost of the above new tools set up and ready for use, \$6,472.

Very respectfully,

JOHN B. HOOVER,  
*Naval constructor, U. S. Navy.*

To the COMMANDANT.

U. S. NAVY-YARD,  
NAVAL CONSTRUCTOR'S OFFICE,  
*Boston, August 30, 1892.*

SIR: In compliance with Bureau order No. 9678-92, I have the honor to submit the following report, suggesting alterations and additions to construction plant, which will in my opinion enable the work to be performed more promptly and economically than at present.

Three plans, A, B, and C, relative to ship-fitting machine shop, showing structure of building and location of tools, are herewith submitted:

Plan A shows position of tools as at present. Plan B shows proposed change in line shafting, location of tools, etc. Plan C gives transverse sections at various points in building; shows lead of and quarter turn in main driving belt required by change in direction of line-shafting proposed. Plan D shows proposed building for plate rack and forge shed with its location relative to adjacent buildings. Plan E shows end elevations A and B building No. 36. A, building as at present; B, building with door; C, as proposed. Plan F, buildings No. 16 and No. 93.

SHIP-FITTING MACHINE SHOP.

Proposed change in line shafting, location of tools, etc.

By reference to plan A it will be readily seen that no adequate provision has been or can be made for transportation of material to and from tools, either the traveling crane H or trolleys, owing to location of beams, shafting, belts, etc. Plan B provided for a change in run of line shafting from a transverse to a longitudinal position in shop, turning and rearranging the tools to correspond, cutting off center portion of and lowering beam and providing platforms and walks over same; thus allowing the use of traveling crane H (now useless) and for trolleys under beams to all tools. It is, therefore, recommended that plan B be adopted and changes made to correspond therewith.

Estimated cost:

Labor .....	\$3,540 00
Material.....	2,214. 10
Total .....	5,754. 10

PLATE RACK AND FORGE SHED.

A building for storage of plate steel, fitted with a traveling crane and the necessary rack for holding plates on edge, is recommended (see D, plan D). It is also recommended that the extension E (see Plan D) be utilized as a forge shed and fitted with a rotary crane for convenience in handling plates, beams, etc.

Estimated cost:

Labor .....	\$12,207 00
Material.....	5,429. 78
Total .....	17,636. 78

BOILER AND ENGINE ROOM, PROPOSED ADDITION TO.

With a view to providing room for an additional boiler, the electric, hydraulic, and air-compression plant, it is recommended that the present frame engine and boiler house (see Plan A) be removed and that the space between the tool room T and bending-roll shed U, 68 feet 1½ inches in length, utilized as a building for the purpose, having a transverse section like N O (see Plan C). In order to bring the above plant wholly under the eye and control of the engineer in charge, it is recommended that the end of tool room V W be moved to X Y (see Plan B).

Estimated cost:

Labor .....	\$3,520. 00
Material .....	1,448. 21
Total .....	4,968. 21

PICKLING TANKS AND CONNECTIONS.

The location of proposed pickling and fresh-water tanks are shown on plan D at end of plate rack, and are located with a view to convenience in handling the plates. Plates selected for use are taken from the rail truck as it leaves the building by an 18-foot jib crane (available for the purpose), and readily deposited in either tank.

These tanks will be of the following (in the clear) dimensions: Length, 25 feet 3 inches; breadth, 2 feet 2 inches; depth, 6 feet 6 inches; be built of 3-inch white pine, and lead lined. The tank pits will be brick lined, laid in cement and made water-tight.

Estimated cost:

Labor .....	\$658. 00
Material .....	620. 50
Total .....	1, 278. 50

#### BOILERS.

Boilers Q and R, now in position (see plan A), require repairs; the water legs leak and steam above 70 pounds pressure is forbidden.

These boilers when in good condition will not furnish sufficient steam for all purposes when shop and sawmill are in full operation. It is therefore recommended that one of the two boilers no longer required for dock use (new boilers and engines having been supplied) be added to present number and all put in good condition. Estimated cost for transportation, uptake connections, and repairs:

Labor .....	\$950 00
Material .....	250. 00
Total .....	1, 200. 00

#### PROPOSED DOORS IN END OF BUILDING NO. 36 (JOINER SHOP).

In the construction of this building no provision was made in size of doors in basement story to admit of loaded teams, in consequence of which all material for use of workmen in the different departments has to be unloaded outside and taken in by hand. At present the basement story is occupied by boat-builders and by the necessary heavy tools, planers, etc.

I have therefore to recommend, for convenience in removing large boats, admission of loaded teams, and for additional light now much needed, that a door be cut in each end of building, as shown at C, on elevation B, plan E.

Estimated cost:

Labor .....	\$1, 350
Material .....	650
Total .....	2, 000

#### SHIP HOUSE, WOODEN BUILDING NO. 92, LOCATED ON SOUTH SIDE OF AND NEAR DRY DOCK.

This building is 200 feet long by 63 feet wide. By being strengthened and repaired (it needs new sills and shingling) it could be used as a shipwright's shop and a second story could be placed therein, the height between ground and roof being ample for the purpose. This floor could be used for light work, storage of tools, molds, rigging, etc. One end could also be used for a paint shop. Temporary repairs on boats, spars, etc., could be done in this building, the launching ways being available for hauling out. A building of this description is absolutely necessary in the immediate vicinity of dry dock for necessary repairs to vessels therein. I earnestly recommend that the repairs enumerated be made.

Estimated cost:

Labor .....	\$3, 650
Material .....	1, 850
Total .....	5, 500

#### BUILDING NO. 16.

Formerly used as an iron-plater's shop and foundry, located just south of ship house No. 92.

This building is 143 feet long by 51 feet wide. It has in it, set up and in working order, a small engine and boiler suitable for light work. The east end has been fitted up for a construction brass foundry.

The building requires new shingling and other general repairs. It is, therefore, recommended that the repairs be made, and that it be utilized as a brass and iron foundry and for a blacksmith shop for dry dock and repair use. Provision is made in estimates for tools, etc., forwarded herewith, for the necessary cupola, blower, etc.

## Estimated cost of repairs, forges, foundations, and connections:

Labor .....	\$2,516
Material .....	1,184
Total .....	3,700

## SCHEDULE OF TOOLS AND MATERIAL REQUIRED FOR CONSTRUCTION PLANT UNDER BUREAU ORDER NO. 9678-92.

*Electric dynamo. (See Plan B.)*

One electric dynamo and attachments complete, including switch-board, containing ammeter, voltmeter, and double pole switch slate mounted.

Machine to run 1,200 revolutions of the armature per minute and develop an electro-motive force of 125 volts and a current of 200 amperes.

Estimated cost delivered at this station, set up and run for approval, \$1,190.

*Shunt-wound drill motors.*

Two shunt-wound drill motors capable of developing 4 H. P. by brake, with a difference of potential of 100 volts.

Each motor to be provided with a strong oak base, swivel trucks, and 100 feet of flexible wire connections.

Estimated cost per motor, \$750; total, \$1,500.

*20-candle and 50-candle power Edison lamps.*

One hundred 50-candle power Edison lamps of 100 volts. Two hundred 20-candle power Edison lamps of 100 volts. One hundred pounds insulated wire. Estimated cost, \$320.

*Blackney's cupola furnace.*

One No. 1 Blackney's cupola furnace and tuyeres with 28-inch shell. Estimated cost, delivered at this station complete in all its parts and ready for use, \$475.

*Sturtevant steel pressure blowers.*

Two No. 3 Sturtevant steel pressure blowers (one for cupola furnace and one for forge shed). Estimated cost each, \$55; estimated cost total, \$110.

*Portable engine and boiler for portable drills, hoisting, etc.*

One 20 H. P. portable engine and boiler, with frame truck hoisting gear, belt pulley, and independent steam pump. Boiler to be a vertical cylinder, 42 inches diameter 8 feet high, containing 85 2-inch tubes, 60 inches long. Engine to be double cylinder type; cylinder, 7 inches diameter; stroke of piston, 12 inches. Must have power to lift a weight of 5,000 pounds. Estimated total weight, 6,000 pounds. Estimated cost, \$1,250.

*Pratt & Whitney engine lathe (for tool room).*

One 16-inch Pratt & Whitney engine lathe, with turret head, cross power feed taper attachment and countershaft; complete length of bed, 6 feet; swing, 16 inches. Estimated cost, \$375.

*Band saw resawing.*

One No. 3 resawing band saw, capable of sawing material 18 inches in width. Diameter of wheels, 40 inches; weight, about 3,500 pounds. Estimated cost, in position and ready to turn, \$650.

*Twenty-inch iron planer (for tool room).*

One Pratt & Whitney 20-inch iron planer, with automatic horizontal, vertical, and angular feeds; bed, 7 feet 6 inches long; table, 5 feet 6 inches, capable of planing 5 feet in length by 20 inches in width; weight, about 4,100 pounds. Estimated cost, in position ready for use, \$725.

*Twenty-inch drill press (for tool room).*

One 22-inch drill press with back gears and automatic feed, to have a swing of 20 inches; weight, about 1,100 pounds. Estimated cost ready for use, \$350.

*Twist drill grinding machine (emery) (for tool room).*

One twist drill grinding machine, able to grind drills from one-sixteenth of an inch to 2½ inches, to be complete and ready for use, including countershaft, equal Fig. 260, Manning, Maxwell & Moore catalogue. Estimated cost in running order, including Flatt drill holder, \$100.

*Grindstone and iron frame (for tool room).*

One grindstone, weighing about 400 pounds, 36 inches by 4½ inches, with iron box and frame, pulley and rest complete. Estimated cost in running order, \$75.

*Heavy pulley-block traveling crane (for plate shed and rack).*

One heavy pulley-block traveling crane, equal to the Yale & Towne, having a span of 26 feet and capable of transporting a weight of 10,000 pounds, to be provided with trolley, pulleys, and propelling gear complete. Estimated cost ready for use, \$1,100.

*Suspended rotary bridge crane (for forge shed).*

One suspended rotary-bridge crane, including suspended track connections, fitted with three arms, trolley, and pulley to each; each arm with its trolley, pulley, and connections to be capable of lifting 6,000 pounds; length of arms, 24 feet; to be equal to the Yale & Towne crane. Estimated cost ready for use, \$1,200.

*Horizontal flange punch.*

One No. 2 horizontal flange punch, equal to Fig. 799, Manning, Maxwell & Moore catalogue; depth of throat, 8 inches; able to punch 1 by 1 inch; weight, 6,000 pounds. Estimated cost in running order, \$830.

*Double angle iron shear.*

One double angle iron shear capable of cutting 6 by 6 inch angles; weight of machine, about 10,300 pounds. Estimated cost in running order, \$850.

*Stow portable drills.*

Two No. 9 Stow portable drills and all attachments complete. Estimated cost each, \$220: \$440.

Two No. 6 Stow portable drills and all attachments complete. Estimated cost each, \$157: \$314.

*54-inch lathe, 24-foot bed.*

One 54-inch lathe with bed 24 feet long, to take 16 feet between centers; head and tail stock to be 7½ feet long; feeds to be independent, lateral, cross, and angular; to be triple geared, with not less than 15 changes of speed; tail stock to be provided with rack and pinion; also a paul to resist thrust; weight of machine 27,000 pounds.

Estimated cost ready for use, \$3,000.

*Circular saws, etc.*

Two cutting-off circular saws, 26 inches diameter; mandrel hole 1½ inches diameter, No. 7 gauge. Estimated price, \$12 each, \$24.

One circular saw, splitting, 26 inches diameter; mandrel hole 1½ inches diameter, No. 10 gauge. Estimated cost, \$12.

One cutting-off circular saw, 17 inches diameter; mandrel hole, 1 inch diameter; No. 12 gauge. Estimated price, \$6.

One cutting-off circular saw, 12 inches diameter; mandrel hole, 1 inch diameter; No. 15 gauge. Estimated price, \$3.

One circular saw, splitting, 17 inches diameter; mandrel hole 1 inch diameter, No. 12 gauge. Estimated cost, \$6.

One Hoe patent steel duplex swage for large circular saws. Estimated cost, \$350.

One No. 1 double-geared saw gummer for large circular saw. Estimated cost, \$20.

*Knife grinder.*

One automatic knife-grinding machine, to grind planer knives, 30 inches long. Estimated cost ready for use, \$150.

*Boiler clamps.*

One dozen steel boiler clamps to open 4 inches from center of screw; screw to run back  $4\frac{1}{2}$  inches. Estimated cost, \$48.

*Taps and dies.*

One box containing a set of Grant's No. 1 die stock, dies, taps, taper plug, and bottoming tap  $\frac{1}{8}$  to  $\frac{1}{2}$  inch. Estimated cost, \$24.60.

One box containing a set of Grant's No. 2 die stock, dies, taps, taper plug, and bottoming tap  $\frac{1}{8}$  to  $\frac{1}{2}$  inch. Estimated cost, \$37.

One box containing a set of Grant's No. 3 die stock, dies, taps, taper plug, and bottoming tap,  $\frac{1}{2}$  to 1 inch. Estimated cost, \$45.

One box containing a set of Grant's No. 4 die stock, dies, taps, taper plug, and bottoming tap, 1 to  $1\frac{1}{2}$  inches. Estimated cost, \$90.

*Morse patent increased twist drills.*

1 dozen  $\frac{1}{8}$ -inch at \$7.20; 1 dozen  $\frac{3}{16}$ -inch, at \$7.80; 1 dozen  $\frac{1}{4}$ -inch, at \$9.60; 1 dozen  $\frac{5}{16}$ -inch, at \$10.80; 1 dozen  $\frac{3}{8}$ -inch, at \$12; 1 dozen  $\frac{7}{16}$ -inch, at \$14.40; 1 dozen  $\frac{1}{2}$ -inch, at \$16.80; 1 dozen  $\frac{9}{16}$ -inch, at \$19.20; 1 dozen  $\frac{5}{8}$ -inch, at \$22.20; 1 dozen  $\frac{3}{4}$ -inch, at \$25.80; 1 dozen  $\frac{7}{8}$ -inch, at \$29.40; 1 dozen  $1\frac{1}{8}$ -inch, at \$33; 1 dozen 1-inch, at \$36; 1 dozen  $1\frac{1}{4}$ -inch, at \$40.80; 1 dozen  $1\frac{1}{2}$ -inches, at \$45.60; 1 dozen  $1\frac{3}{4}$ -inches, at \$50.40; 1 dozen  $2\frac{1}{4}$ -inches, at \$54.

*Leather belting.*

Twenty-four inch belting (leather link), 70 feet, at \$6, \$420; 24-inch belting, leather double, 250 feet, at \$6, \$1,500; 9-inch belting, leather double, 100 feet, at \$1.73, \$173; 6-inch belting, leather double, 600 feet, at \$1.14, \$684; 4 $\frac{1}{2}$ -inch belting, leather double, 200 feet, at \$0.84, \$168; 4-inch belting, leather double, 500 feet, at \$0.75, \$375; 3 $\frac{1}{2}$ -inch belting, leather double, 300 feet, at \$0.65, \$195; 3-inch belting, leather single, 250 feet, at \$0.36, \$90. Estimated total cost, \$3,605.

*Hydraulic plant.*

One hydraulic ram accumulator pump and connections complete; ram 12 inches diameter, 16-inch stroke, and capable of exerting a pressure of 2,000 pounds per square inch. Estimated cost complete and in running order, \$2,200.

*Hydraulic riveters.*

One hydraulic riveter capable of riveting plates 36 inches wide and rivets 1 inch diameter. Estimated cost, \$550. Two hydraulic riveters capable of riveting plates 54 inches wide and rivets 1 inch diameter. Estimated cost, each \$750, \$1,500.

## RECAPITULATION.

*New buildings, repairs and alterations in same.*

	Labor.	Material.	Total.
Ship-fitting machine shop, proposed change in line shafting and location of tools .....	\$3,540.00	\$2,214.10	\$5,754.10
Proposed plate rack and forge shed .....	12,207.00	5,429.78	17,636.78
Proposed increase to engine and boiler room .....	3,520.00	1,448.21	4,968.21
Proposed pickling and water tanks .....	658.00	620.50	1,278.50
Proposed addition to boiler power .....	850.00	250.00	1,200.00
Proposed doors in ends of building No. 36 .....	1,350.00	650.00	2,000.00
Proposed repairs to shiphouse building No. 92 .....	3,650.00	1,850.00	5,500.00
Proposed repairs to building No. 16, smithery, foundry, etc .....	2,516.00	1,184.00	3,700.00
<b>Total cost .....</b>	<b>28,391.00</b>	<b>13,646.59</b>	<b>42,037.59</b>



*New tools.*

	Cost per unit.	Total cost.
One electric dynamo.....		\$1, 190. 00
Two shunt wound drill motors.....	\$750. 00	1, 500. 00
Three hundred Edison lamps and wire.....		820. 00
One Blakeney's cupola furnace.....		475. 00
Two No. 3 Sturtevant blowers.....	55. 00	110. 00
One portable engine and boiler.....		1, 250. 00
One 16-inch Pratt & Whitney engine lathe.....		375. 00
One resawing band saw.....		650. 00
One 20 inch Pratt & Whitney iron planer.....		725. 00
One 22-inch drill press.....		350. 00
One twist drill grinding machine.....		100. 00
One grindstone, mounted.....		75. 00
One heavy pulley block traveling crane.....		1, 100. 00
One suspended rotary bridge crane.....		1, 200. 00
One No. 2 horizontal flange punch.....		830. 00
One double angle iron shear.....		850. 00
Two Stow portable drills, No. 9.....	220. 00	440. 00
Two Stow portable drills, No. 6.....	157. 00	314. 00
One 54-inch lathe, 24-inch bed.....		3, 000. 00
Two circular saws, 26-inch.....	12. 00	24. 00
One circular saw, splitting 26 inches.....		12. 00
One circular saw, 17 inches.....		6. 00
One circular saw, 12 inches.....		3. 00
One circular saw, splitting 17 inches.....		6. 00
One duplex swage.....		3. 50
One double geared saw gummer.....		20. 00
One automatic knife grinder.....		150. 00
One dozen boiler clamps.....		48. 00
One box No. 1 taps and dies.....		24. 00
One box No. 2 taps and dies.....		37. 00
One box No. 3 taps and dies.....		45. 00
One box No. 4 taps and dies.....		90. 00
Seventeen dozen Morse patent drills.....		435. 00
Leather belting, 2270.....		8, 065. 00
Hydraulic plant.....		2, 200. 00
Three hydraulic riveters.....		2, 050. 00
Total new tools.....		23, 613. 10
Total new buildings, etc.....		42, 037. 59
Grand total.....		65, 650. 69

Respectfully submitted.

WM. HICHBORN,  
General Foreman in charge, Department Construction and Repair.

Capt. ALBERT KAUTZ, U. S. Navy,  
Commanding.

COMMANDANT'S OFFICE,  
U. S. Navy-Yard, Boston, August 30, 1892.

Respectfully submitted to Bureau.

ALBERT KAUTZ,  
Captain, Commanding.

OFFICE OF THE NAVAL CONSTRUCTOR,  
Navy-Yard, New York, August 31, 1892.

SIR: Referring to the Bureau's letter of 2d instant, No. 9678-92, I have the honor to make the following report and recommendations for the improvement of the construction plant at this yard:

In addition to the lack of certain machine tools and appliances, the chief causes that tend to reduce the efficiency and to increase the cost of working are the scattered location of shops, docks, and slips, and the unsuitability of many of the buildings for the purposes to which they are now assigned. The scattered location causes loss in transit of workmen, carrying to and fro molds and templates in fitting work, the increased difficulty of proper supervision, the great cost of transporting material, particularly to ships lying beyond the dry docks, and on account of the great number of power stations required. During the past year this department has had in constant operation from seven to nine steam plants, requiring separate sets of firemen and engineers, and resulting in great loss from the unfavorable conditions under which these small engines work. In case of the joiner shop, where the steam is

carried in an overhead pipe across a street, it has cost 25 to 30 tons of coal per month, or upwards of 20 pounds per horse power per hour.

The bending shed is a frame structure in bad condition, and is in constant danger from fire. The furnaces are too small. A new shed and furnaces are required before important new work should be taken in hand.

Much annoyance and delay results from the lack of suitable offices and drafting rooms. They are temporarily located in building No. 10. This building has been for years used for the stowage of oil in bulk. It is in a bad sanitary condition, complaint being constantly made of violent headaches due to remaining a few hours at one's desk when the weather or other circumstances require the office to be closed. The great amount of smoke and soot from the smith shop opposite that comes in at open windows is a great detriment to the work and very annoying. The space available is entirely too small. A temporary inclosure had to be built to accommodate a sufficient number of draftsmen and it is necessary to crowd clerks into poorly lighted and poorly ventilated rooms.

A new assignment for the pattern shop is required. This shop is now located immediately under the roof of a low building where during summer the heat makes it impossible for the men to work efficiently and also causes loss from deterioration of standard patterns. The cellar of this building is always foul and damp and contains an amount of water that apparently varies with the height of the tide.

The joiner shop, on account of the unsafe condition of building No. 6, had to be moved into building No. 14, leaving but a small portion available as a mold loft.

Considerable improvement has already been made in various departments, but to secure a good, efficient, and economical plant it is necessary that a fixed and comprehensive scheme should be followed. I earnestly recommend that some such scheme be adopted so that, except in cases of emergency or slight running repairs, all money for improvement of plant can be expended in accordance with the approved plans.

The following rearrangement of the plant and additions (as shown by accompanying chart) is proposed. I recommend that its approval be urged, Part I to be carried into effect as soon as possible, Part II before any extensive new work is undertaken, and Part III from year to year, as found necessary for the work directed to be done at this yard.

#### PART I.

(1) That as previously recommended, building No. 6, the old joiner shop, should be rebuilt, and assigned to this department, the first and second stories for offices, stores, and drafting rooms, as shown on accompanying plan. A third story should be added when rebuilding; it would make the temperature more even and afford ample dry storage, such as was not available in this department when it was recently desired to store the cellulose for the new ships. No ceiling need be fitted to the roof trusses. This plan provides an ample number of offices and a commodious drafting room, conveniently located and free from the dirt and soot of the shipsmith shop.

(2) That a central power station be established in building No. 10. New pumps having been proposed for the stone dry dock, the present pump room will accommodate the new pumps, the engine now in the punch shed, and the electric and hydraulic plants. The present boiler room should be fitted with new boilers and should have a ventilation shaft constructed over it to take off the heat that otherwise spreads through the whole building. By means of shafting and wire rope transmission this plant would furnish power to the punch shed, iron plating shop, smith shop, paint shop, foundry, plumbing shop, joiner shop, and pattern makers and block shops, thus reducing the power stations to two, the other being at the sawmill, where wood can be used to a great extent. The sawmill will soon require a new engine and boilers; by means of shafting and wire rope transmission this plant can furnish power to the boat shop and oakum mill.

(3) The compartment next to boiler room on lower floor of building No. 10 should be used as a central tool house. The rest of the building should then be used as a joiner and cabinet-maker's shop. In that case the upper floor of building No. 14, temporarily in use as a joiner shop, would be restored as a mold loft, and the lower floor would be used for blockmaker's, patternmaker's and coopers' shops.

(4) The removal of the engines, boilers, and testing room from the punch shed allows a rearrangement of the machinery there; the heavy tools can be brought down from building No. 118 and thus leave the whole of this shed for a steel shed and plate rack.

(5) By removing certain ship-fitting tools from the iron plating shop to the punch shed sufficient space is acquired in the former for an efficient brass finishing shop.

(6) A shed is required for the shipwrights at each dry dock.

## PART II.

(7) New smith shops have been proposed for the steam engineering department. This would leave the portion of No. 11 now used by engineering available for use as the construction foundry. As this building was formerly used as a foundry, and the cupola, brass furnaces, core oven and steps for cranes are still in place, it could be readily fitted up. The present foundry should be used as a galvanizing shop.

(8) A new bending shed and flange turners' shop, also an angle smithery, should be erected where shown on chart. This takes up the slip recently occupied by the *Intrepid*, only available for a very small vessel, but still leaves three others.

## PART III.

(9) A new building should be put up on the present site of the wooden buildings Nos. 115, 117, and 118. It should have a lofty, well-ventilated ground floor to be used as a punch shed and steel shed, with pickling tank, etc., and a second story spanning First street, to be used as a mold loft and pattern shop.

(10) Should an experimental tank be constructed at this yard, a site contiguous to the construction plant is available, as indicated on chart.

I most earnestly recommend that all new buildings should be substantially constructed of brick and iron. Light wooden structures for machine shops furnish very bad support for the heavy shafting required, are soon in bad repair, and are in constant danger from fire.

The scheme proposed above will as soon as building No. 6 is repaired provide good offices and drafting rooms, allow the transfer of joiner, pattern, and cooper shops, provide a brass-finishing shop, and establish a central fire station. At the end of a few years it will provide a compact and most efficient plant, capable of keeping up all repairs required, and at the same time carrying on such building programme as would probably be assigned to this yard.

To carry into effect Part I of the above scheme, the following changes and additions are required. They are necessary for efficiency and economy in carrying on the new work in hand and to put the new plant in a condition to expeditiously and economically make such repairs on the new ships as will probably be demanded of this yard.

*The ship yard.*

[Estimated cost ready for work.]

1. Portable hoisting engine .....	\$1,200
2. Five-ton locomotive crane .....	4,500
5. Ten-ton wharf crane .....	7,000
4. Five standard-gauge push cars .....	200
5. For cleaning ships' bottoms, pumps with permanent lines of pipe should be fitted to furnish water under pressure around all dry docks, hose connections to extend to the bottom of the docks .....	3,500
6.* The caissons at each dock should be altered and a track added joining the yard railway system for transportation of material on push cars or trucks .....	
7.* Power capstans should be placed around all dry docks .....	

*Plumbing and pipe-fitting shop.*

8. 10-inch Pillar shaper .....	500
9. 16-inch engine lathe .....	560
10. Metal workers and tinners' tools, folder, groover, burring machine, turning machine, seaming machine, slip-roll former, oval-handle former, cleat former, tinners' snips, bench shears, bench drill .....	400
11. Planishing machine .....	400
12. Small blower for coppersmith .....	35

*Foundry.*

13. New brass furnaces, work to be done by yard force .....	2,500
Two small wall cranes .....	150
14. Small core oven .....	80
15. Casting cleaner .....	300

\* Under cognizance Bureau Yards and Docks.

*Machine (iron-plating) shop and brass-finishing shop.*

16. 40-inch planer to plane 10 feet long, with chucks, etc .....	\$3, 200
17. Screw-slotting machine .....	150
18. One 16-inch engine lathe .....	560
19. One 8-inch brass-finishers' cabinet turret lathe .....	900
20. Three upright drill presses .....	1, 500

*Joiner shop.*

21. One power mortiser, with attachments .....	275
22. Emery tool-grinder .....	80
23. Cabinetmakers' 24-inch finishing planer .....	300
24. 16-inch pedestal jointer .....	175

*Blacksmith shop.*

25. 350-pound steam hammer with plain dies .....	720
26. 2,500-pound steam hammer .....	2, 600

*Tool room.*

27. Tool-grinding machine .....	1, 400
28. Grindstone dresser .....	30

*Pattern shop.*

29. Face-plate lathe .....	400
30. Three trimmers .....	100
31. Hand-saw setting machine .....	20
32. Band-saw filing machine .....	25
33. Crane for lifting boats from the water to the boat truck .....	4, 000
34. New steam plant at saw mill (this does not include a new boiler house, which is also required) .....	7, 500
35. Establishing central power station in building No. 10 .....	48, 000
36. Repairing building No. 6 for offices, etc .....	

Part II requires the following changes and additions, all of which should be made before any extensive new work is taken in hand:

37. One new angle furnace .....	\$6, 000
38. Revolving beam forge .....	200
39. Hydraulic plate bending and flanging machine .....	15, 000
40. Spinning machine for plumbers' shop .....	650
41. New forges for anglesmith shop .....	600
42. Two new countersinks .....	500
43. Double angle shears .....	1, 800
44. Pneumatic system for working cranes in shops, capstans at docks, and calking tools on ships, small cranes included .....	9, 000
45. New bending shed .....	25, 000
46. New angle and smith shop .....	15, 000
47. New shipwrights' sheds at each dry dock .....	44, 000
48. Vertical roller brushes, with cranes, for cleaning plates after pickling ...	900

Part III requires in addition to the above items the following changes to put the plant in first-class order, capable of carrying on expeditiously and economically all repairs that would probably be required by a fleet of modern ships at the same time carrying on a building programme of three ships in four years.

49. New building on site of punch shed, first floor to be used as punch shed, steel shed and pickling shed. Second floor to be used for mold loft and pattern shop.
50. Canal and pond for boat shed, repairs to boat shop.

I earnestly recommend that when the cooper and pattern shops are removed from building No. 9 it be suitably fitted up and assigned for use of the employes as a lunch room. A suitable person should be selected whose duty will be to heat the building and keep it in proper state of cleanliness. In return for these services this attendant should be granted the privilege of selling tea, coffee, and such light food as might be suited to the wants of the men, the price and character of the same to be regulated by the commandant, the room to be so arranged that men bringing their

own lunch shall be equally as comfortable as those who buy. I recommend this arrangement in the interest of morality, economy, and cleanliness.

The foregoing estimates have been made without drawings or specifications and can only be considered as approximate.

Plans and estimates will be furnished when required.

Very respectfully, your obedient servant,

F. L. FERNALD,  
*Naval Constructor, U. S. Navy.*

COMMANDANT NAVY-YARD AND STATION,  
*New York.*

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NAVAL CONSTRUCTOR'S OFFICE,  
*Navy-Yard, League Island, Pa., September 1, 1893.*

SIR: In compliance with the instructions contained in Bureau's letter No. 9678-92, of the second ultimo, I herewith submit the following suggestions and accompanying outline plans (tracings) relative to improvements, alterations, and additions to the construction plant of this yard.

The tracings, six in number, represent the following subjects: (1) plan of yard. (2) construction building; (3) smithery; (4) foundry; (5) ship-fitting shop; (6) ship fitting shop, section of.

The suggested improvements embrace the removal of the boat shop from the old ship house to the south end of the construction building; a shop for plumbers, coppersmiths, and tanners; a shop for galvanizing, erection of new engine and boiler house to supply the ship-fitting shop; the foundry belonging to steam engineering to be for the joint use of steam engineering and construction and repair departments, and the purchase of certain tools and appliances to complete the present plant for repairing purposes.

Taking up the above-named subjects in their order, the importance of a more suitable location for the boat shop is the first to be considered.

#### THE BOAT SHOP.

The boat shop is at present located in the old ship house. The light is insufficient and the floor, owing to the decayed condition of the building, is not safe to put up boats weighing from 1,200 pounds upwards to 3 tons, and the trouble and expense in hauling boats in and out of the shop are also considerable. The foundation of the ship house is now being overhauled and strengthened, but the general unreliability of the frame work, beams, floor, and roof is such as to make its abandonment as a boat shop desirable as soon as possible.

It is proposed to bulkhead off the lower floor of the construction building and make a boat shop of the south end, 203 feet 6 inches in length by 60 feet 3 inches wide (see plan 2). It will be necessary to put a wooden floor throughout the entire length and breadth of this shop. The present floor of concrete 4½ inches thick was placed directly on top of the earth, and has settled unequally, in some places as much as 6 inches. It is proposed to cut through this concrete floor across the shop in wake of each pillar, and place timbers 12 by 16 inches upon the foundation stones of the pillars and walls of the building. These timbers are to project about 3 inches above the concrete floor, and in the intervals timber is to be laid on top of the concrete, upon which again planking 3 inches in thickness will be laid fore and aft.

The cost of this floor and bulkhead, outfit of new boat shop, with tools, etc., will be about: Floor, \$1,800; tools and fitting up, \$2,500; total, \$7,300.

#### SHOPS FOR PLUMBERS, ETC.

The present smithery, as shown on plan 3, is a frame building erected some sixteen or eighteen years ago. Its sills, etc., have, however, been renewed during the past summer, and the building is possibly good for twelve or fourteen years more. A couple of small steam hammers are needed in this shop. The number of forges indicated on the plan will probably be sufficient for the work that may be required for some time to come, and it is recommended that the space nearest the engine and boiler be set apart and fitted up for the use of plumbers, coppersmiths, and tanners. This work is now being done in the upper end of the ship-fitting shop, but the space can not well be spared any longer, and it is desirable that the work be done under its own roof. It is suggested that a space outside the smithery be housed in and fitted for galvanizing purposes. A smelting pot is on hand, and the expense of setting it and to effect other improvements required in that direction will be trifling.

The estimated cost of fitting up these shops is as follows: Shops proper, \$550; to etc., \$1,800; total, \$2,350.

## ENGINE AND BOILERS FOR SHIP-FITTING SHOP.

The engine and boilers for this purpose have been contracted for, and the location indicated on plan 5 has been selected as the most available. At present steam is supplied to the ship-fitting shop and sawmill from the boilers of the latter, while two engines, one near the sawmill and the other in the ship-fitting shop, drive the respective machinery. The boilers in use at the present time are likely to give out soon, nor is their capacity adequate to the demands, but the new boilers and corrugated iron house can be put up and connections made without disturbing the old boilers. The new engine house should be of brick to correspond with the ship-fitting shop. At present it is only proposed to put in two new boilers, but when occasion demands additional boiler room can be found without encroaching on the street space. It is further proposed to locate the angle and plate furnaces as indicated, which, with the bending floor running quite out to the street line, affords the easiest means of transportation of frames, etc., to the part of the yard on the west of the dry dock, where building will have to be done, or to repairs of ships in the dock.

The floor in the ship-fitting shop is very much decayed, and it is recommended that a new floor be laid which will be substantial enough and laid with such precaution as to make its endurance good for at least fourteen years. Plan 6 is explanatory of the manner proposed. Piling is absolutely indispensable, and the concrete piers, running fore and aft upon the caps and upon which the joists are laid, minimize the destructive effects on timber and flooring in keeping them out of the dampness as much as practicable. Ventilation can also be readily obtained through the floors.

The several tools and their location are indicated on plan 5, and, as will be noticed, there is still room for several much desired machine tools, of which the following list is submitted:

2 16-inch screw-cutting engine lathes, at \$500 .....	\$1,000
1 pipe threading machine to cut from 2 to 6 inches .....	800
1 screw machine .....	350
1 double-head screw machine .....	585
1 radial drill press, 60-inch arm .....	800
2 drill presses, assorted sizes .....	450
1 20-inch triple gear-shaper .....	400
1 grinding machine for 16-inch emery wheel .....	75
12 by 24 turn-table rapid lathe .....	1,100
1 sheet-iron circular machine .....	250
1 hand bending rolls, 4 by 48 inches .....	100
1 sheet iron break or firmer .....	250
1 centrifugal chip and waste cleaner .....	125

Total .....

6,285

A Detrick and Hervey open-side planer is also very useful, and at least one multiple drill for ordinary and thick plates would be required at an estimated cost of \$5,500 for both tools. The estimated cost of improvements under the head of ship-fitting shop is as follows:

Engine house and foundation .....	\$6,800
Boiler house and foundation .....	3,400
Furnaces, bar, and plate .....	9,000
Petroleum reservoir .....	750
Bending slabs .....	4,600
Floor in shop and replacing tools .....	10,800
Tools .....	11,785

Total .....

47,135

## BRASS FOUNDRY.

One of the foremost requirements in the repairs of ships of the new navy is a well-equipped brass foundry. In the course of time it might be most advantageous to have a foundry placed in near proximity to the ship-fitting shop, but for the present the iron and brass foundry, belonging to the department of steam engineering, would, no doubt, answer the purpose for both Departments. Plan No. 4 shows its general arrangement and the frame building, although somewhat out of repair, could be put in good condition at small expense. If permission could be obtained by construction and repair to use the brass foundry the principal expense would be in getting an outfit of crucibles and a few other tools necessary for brass work, at an estimated cost of \$675.

The foregoing completes all the immediate requirements to enable the construction department to execute economically and rapidly such repairs as may be needed by any ship sent to this yard. The joiner shop (see plan No. 2) is in first-class condition, and with the tools on hand it can perform any work required in the line of ship-joining, cabinet-making, or pattern-making.

The additions proposed to meet further exigencies, but not of pressing need just now, are shown in a general way on Plans 1 and 5. A new mold loft will be required and storage provided for such lumber as yet enters into the construction of steel ships. The smithery will have to be enlarged to accommodate larger steam hammers than can now be put up in the present constructed shop, while additional room will be required for bending slabs for heavy smith work, and a considerable space will be needed for the anglesmiths and welding of beams and beam knees. The usefulness of the sawmill is no longer imperative and it is only a question of, perhaps, a short time when it may be discontinued and removed and the valuable space occupied by it utilized for modern ship-building purposes. The outline of the shed indicated in red lines contemplates the erection of an iron framed shed covered with corrugated iron where needed, to be 20 feet high, with an addition of 18 feet to cover the scive board. Under this shed would be housed the furnaces, bending floor, scive board, plate-cleaning tanks, hydraulic keel plate bender, the boilers supplying the steam for tools in the ship-fitting shop and shed, and such tools as punches, shears, etc., as require considerable space to manipulate frame angles, long plates, etc. As these contemplated additions are not intended to be made at once they are submitted rather as an idea of what I believe essential towards making the ship plant complete, but has no bearing on present needs. The approval of these additions will be required before any proximate estimate of their cost can be furnished.

To sum up, the following estimates under each head of improvements already above mentioned shows the aggregate cost:

#### RECAPITULATION.

Boat shop .....	\$7, 300
Plumber and other shops .....	2, 350
Ship-fitting shop .....	47, 135
Brass foundry .....	675
Grand total .....	57, 460

Respectfully submitted,

J. FEASTER,  
Naval Constructor, U. S. Navy.

The COMMANDANT.

COMMANDANT'S OFFICE,  
Navy-Yard, League Island, September 12, 1892.

Approved and forwarded to Bureau of Construction and Repair.

W. A. KIRKLAND,  
Captain, Commandant.

NAVAL CONSTRUCTOR'S OFFICE, U. S. NAVY-YARD,  
Norfolk, Va., August 22, 1892.

SIR: Referring to the letter of the Bureau of Construction and Repair, No. 9678-'92, dated August 2, 1892, I have the honor to submit the following suggestions for improving the construction plant at this yard, to enable the work of this department to be performed with increased economy and rapidity.

As the work of this department is intimately connected with the general arrangement and facilities of the navy-yard, I respectfully suggest certain improvements not immediately under the direction of the Bureau of Construction and Repair, in addition to stating the immediate requirements of the various shops of this department.

The smithery, building No. 9, is in an unsafe and dangerous condition with walls cracked and distorted from the vibration of the steam hammers; it should be condemned and torn down. The foundry occupies a portion of the north wing of this building, entirely inadequate for the present purposes. The small two-story building between the two wings is occupied by the plumbers, coppersmiths, and tinsmiths, the smithery engine and blower, and the electric welding plant. Additional room is absolutely necessary.

The shipfitters' shop, building No. 37, is so small that the machine tools therein are greatly cramped and crowded and there is not sufficient space for the additional tools required nor for a proper arrangement of large and small tools with the neces-

sary facilities for the receipt and handling of rough materials, transportation to the various tools and the handling when there, and the proper stowage of work in all stages of completion; also, this shop is built over a large cistern, so that suitable foundations for large tools can not be constructed.

It is therefore suggested that a new shipfitters' shop be erected in the vacant lot adjacent to the timber basin, which shall have wings and galleries and be fitted with traveling cranes, elevators and all modern appliances, electric plant, new shop engine and boilers, and additional machine tools, and be connected with the railroad system of the yard.

In building No. 42, thus vacated, it is proposed to locate the foundry at the north end, utilizing the present chimney, enlarging the plant with cupolas and cranes; the south end of this building to be rearranged in two stories for plumbers, copper-smiths, tin-smiths, and pipefitters.

Building No. 9, the present smithery, to be torn down and a new one erected having iron framework and corrugated iron sides and roof, and be supplied with a 5,000-pound steam hammer, a new reverberatory furnace and the jobbing, angle, and beam forges to be rearranged.

Estimated cost of changes and installation of tools, rearrangement of shop interiors, and new tools and equipments, \$130,000.

The timber basin is now filled with live oak logs, greatly deteriorated from age and exposure, and spruce spar timber, and during the summer months can not be kept in a proper sanitary condition. The water front wharfage of this yard is insufficient and can be extended only in a direction away from the principal shops. It is therefore suggested that a wall and gate be constructed across the continuation of Rowan avenue, the portion of the dock west to be used for preserving mast and spar timber, the portion east to be deepened and provided with suitable retaining walls and wharfage and used as a fitting out and repairing basin, with a railroad track along each side and one end, a pontoon bridge to be at eastern end.

As the dry docks at this yard are not of sufficient size to permit the docking of the large battleships now being designed and constructed, it is suggested that another dock of increased breadth and length be built south of dock No. 2.

When ships in dry dock or in the vicinity are undergoing repairs much time is lost by the workmen in going to and from the shops, which are 2,000 feet distant. It is suggested that a one-story shop, with a shed at each end, be built between the two dry docks and supplied with a small outfit of machinery and a motive engine of 40 horse power, for which steam could be obtained from the pump house. The sheds would provide convenient stowage for docking gear and cover for stage plank shores, horses, etc., which deteriorated rapidly from exposure.

10 horse-power engine .....	\$1, 200
3 lathes .....	1, 500
2 drills .....	600
Bolt cutter .....	360
Plate planer .....	3, 400
Pipe cutter .....	125
Radial drill .....	1, 400
30-inch planer .....	1, 700
Tool-grinder .....	250
Punch and shears .....	3, 000
Shaper .....	1, 200
Milling machine .....	800
Twist drill grinder .....	175
Fan .....	100
Forges .....	150
Small tools and fittings .....	1, 000
Shafting and piping .....	2, 000
Total .....	19, 100

A locomotive 10 ton traveling crane and car would greatly reduce the cost in handling the material of this department, \$4,300.

A floating self-propelling derrick with revolving jib having a capacity of 80 tons is very necessary, and could be built and maintained by this department to advantage; the facilities now available for handling heavy weights are inadequate to the work of the yard, \$75,000.

The water closets and urinals used by workmen are entirely inadequate for the purpose; they are small, obnoxious, and unsanitary, and have increased the cost of the new ships to a very considerable extent, owing to the great loss of time necessitated by their position and arrangement. It is urgently recommended that an increased number of new and improved closets and urinals be installed without delay.



The following tools are needed at once:

Shipfitter's shop:

Milling machine .....	\$1,650
16-inch slotting machine .....	2,000
48-inch boring and turning machine, two heads .....	2,275
42-inch engine lathe, 18 foot bed .....	2,750
Key seater .....	350
Three lathes .....	2,300
Small tools, machines, etc. ....	500

11,925

Shipfitter's shed:

Hydraulic flanging press .....	2,500
Twist drill grinder .....	180
Small tools, etc. ....	250

2,930

Smithery:

1 heavy general forging machine .....	3,500
Dies, blocks, and small tools .....	700

4,200

Plumber's shop:

Small machines, tools, and mandrels .....	400
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Joiner shop:

Twist machine .....	470
Molding machine .....	420
Lathe, woodworkers .....	350
Sandpapering machine .....	300
Veneer press .....	290
Hand lathe .....	250
Small tools and fittings .....	350

2,330

Boat shed:

Planking machine .....	1,000
Boat frame bender .....	750

1,750

Pattern shop:

Wood worker's lathe .....	250
Small tools .....	125

375

Grand total..... 23,910

Very respectfully,

FRANCIS T. BOWLES,  
Naval Constructor, U. S. Navy.

Commodore A. W. WEAVER,  
U. S. Navy, Commandant.

Respectfully submitted to the Chief of Bureau of Construction and Repair.

B. J. CROMWELL,  
Captain, commanding.

NAVAL CONSTRUCTOR'S OFFICE,  
Navy-yard, Mare Island, Cal., August 22, 1892.

SIR: In obedience to the order of the Bureau of Construction and Repair, contained in its letter No. 9678-92, of the 2d instant, I have the honor to submit the following report concerning the improvement of the construction plant of this yard, which will enable work to be performed more economically or promptly.

I have the honor to forward herewith plans showing the proposed arrangement of the construction plant in connection with the buildings and machinery already on hand, as follows:

No. 1006, proposed general arrangement of construction shops. New buildings and alterations indicated by red ink.

No. 1007, proposed arrangement of iron-working plant.

## A.—IMMEDIATE IMPROVEMENTS.

Certain improvements should be undertaken at once to permit the carrying on of work economically and promptly. These are, in the order of their importance—

(1) The building of bending slabs and angle and plate furnaces in connection therewith.

(2) The erection of a ship fitter's shed for punches, shears, plate-planers, etc.

(3) Purchase of new machine and power tools.

(4) Should a ship be ordered built in the yard, the slip on which the *Mohican* was built can be utilized with some additional piling and other preparations. A scrive board and shed to be built at the location shown on the plan.

## B.—ULTERIOR IMPROVEMENTS.

Many of the iron and woodworking tools contained in the various buildings are antiquated and nearly worn out. The general dispositions of the woodworking and some other shops require rearrangement to suit modern methods, but are still fairly efficient, at present, for the amount of work apparent on hand. Additional tools should be bought to make a well rounded plant.

## C.—IMPROVEMENTS COMING UNDER THE COGNIZANCE OF THE BUREAU OF YARDS AND DOCKS.

Among the improvements not built by the Bureau of Construction and Repair, but used by it more or less exclusively, are the following:

Should active operations in shipbuilding be undertaken at the yard additional slips will be required, and the old sectional dock basin could be utilized for that purpose. This old basin is solidly piled at a depth of 12 feet below high water, and is now filled up with mud. It could be dredged out and piers and blocking placed on the old piling to make two excellent building slips.

The yard is extremely deficient in buildings for the proper storage of lumber, a large proportion of it being now stowed in temporary sheds, where it is very inefficiently protected.

An additional dry dock is very desirable, as the sectional dock is useless in its present condition, and has a capacity only for small vessels.

A system of standard gauge railway, in connection with a ferry slip from which railroad cars could be sent directly into the yard and shops, is very desirable.

Additional quay walls are desirable to provide room for vessels repairing and fitting out in the part of the yard south of the ferry slip contiguous to the shops.

## A.—IMMEDIATE IMPROVEMENTS, PLAN NO. 1007.

1. *Bending slabs and angle and plate furnaces.*

These are imperatively necessary for building modern vessels. The proposed location is shown on the plan. They are placed between the two L's of the main construction building in such a position as to avoid the expense of a large chimney; the one already built is of ample size for both the present boiler plant and the proposed furnaces. It will be necessary to remove the old gasholder, shown on the plan, which is not necessary, as the yard is lighted by electricity. It will be necessary to build a light shed over furnaces and slabs to protect them from the weather. The proposed location will concentrate all the smith and furnace work in a central position. It is proposed to erect the hydraulic keel plate bender now on hand in the position shown in connection with the plate furnace. A certain amount of excavation will be necessary in connection with the establishment of slabs and furnaces.

Slabs, foundation for same, and hydraulic keel-plate bender.....	\$12,000
Plate and angle furnaces.....	12,000
Shed to cover plate and angle furnaces.....	4,000

2. *Transmission of power.*

A large Corliss engine of 250 horse power runs the new machine shop, completed during the past year. This engine provides ample power to drive all the machinery in the construction plant, and it is proposed to utilize its power by wire-rope transmission to run the sawmill machinery in building 42 and the woodworking machinery in building 40, indicated on Plan 1006.

The engine, although erected on its foundations, is covered only by a temporary shed, which is insufficient to protect it from the weather. A new wooden building for this engine is necessary, floors, gratings, etc.

3. *Proposed ship fitters' shed.*

A substantial open shed for ship fitters' tools is imperatively necessary. The climate in this part of the country renders a closed building unnecessary.

A considerable portion of the tools already purchased for the yard are now stowed for lack of suitable shops and sheds, and others absolutely necessary for the work on the *Monadnock*, have been temporarily erected in the part of the building marked proposed foundry. It is proposed to erect a wooden shed, with corrugated iron roof, closed only at the back against the prevailing winds. The building to be in three bays, each 50 by 150 feet, making a shed 150 feet square, which it is thought will be ample for present purposes. Should the ship building plant be eventually enlarged, it will be easy to extend the bays in length or add additional bays. It is proposed to furnish power for this shed from the Corliss engine, by belting over from the shafting in the machine shop, as shown on the plans.

Erection of shipfitters' shed, complete .....	\$28, 000
Erection of line shafting, tools, and foundation for same .....	12, 000

4. *Machine and power tools.*

To complete the iron working plant, to carry on the construction of say three modern vessels, a number of tools are required, as indicated in the following summary list, the following tools to be supplied at once:

## For shipfitters' shed:

1 combined punch and shears, for 1½-inch plate, 30-inch throat .....	\$4, 000
1 combined punch and shears, for 1½-inch plate, 30-inch throat .....	3, 300
3 combined punch and shears, for ½-inch plate, 30-inch throat, at \$3,000 .....	9, 000
2 plate-planing machines, for plates 23 by 6 feet by 1 inch, at \$5,600 .....	11, 200
1 plate-planing machine, for plates 18 feet long by 1 inch thick .....	3, 000
1 cold saw cutting machine, capacity 48 by 6 inches .....	2, 000
Set of tanks and cranes, for pickling plates .....	2, 500
4 jib crane countersinks, 8 feet radius, at \$400 .....	1, 600
	<hr/>
	36, 600

## For machine shop:

1 planing machine, 60 by 60 inches, 20-foot bed .....	5, 000
1 crank planing machine, 20 by 20 inches, 24-inch stroke .....	1, 300
1 engine lathe, 60-inch swing, 20-foot bed .....	3, 000
1 engine lathe, 30-inch swing, 18-foot bed .....	2, 000
1 engine lathe, 24-inch swing, 12-foot bed .....	1, 300
2 engine lathes, 16-inch swing, 8-foot bed, at \$600 .....	1, 200
2 hand and drilling lathes, 12-inch swing, 6-foot bed, at \$200 .....	400
1 turret head, chucking lathe .....	1, 200
1 shaping machine, 16-inch stroke, two tables .....	1, 800
1 slotting machine, 12-inch stroke .....	1, 500
1 power milling machine, 12-inch table, 8½ inches from spindle to table .....	1, 400
1 cutter grinder, Universal .....	\$350
1 horizontal boring machine, to bore 61 inches .....	2, 500
1 pipe-cutting machine, for pipe 1 to 3 inches .....	100
1 pipe-cutting machine for pipe 2½ to 8 inches .....	800
1 metal band saw, for sawing small brass work, etc .....	300
1 radial drill, 84-inch swing .....	2, 400
1 radial drill, 60-inch swing .....	1, 200
1 emery-wheel tool grinder, 36-inch wheel .....	600
Miscellaneous chucks, drills, vises, and other small tools .....	7, 000
	<hr/>
	35, 350

## For woodworking shops:

1 planing and matching machine, for plank 24 by 6 inches .....	1, 300
1 multiple gaining machine .....	600
1 horizontal mortising machine .....	500
1 self-feeding ripping-saw table .....	300
1 gap patternmakers' lathe, 25 by 50 inch swing .....	750
1 blind slot tenoning machine .....	200
1 blind wiper .....	50
1 carving machine .....	150
2 Universal trimmers, at \$75 .....	150
1 door and blind clamp, iron frame .....	300
1 sand papering machine, 6 roll, double cylinder .....	650
1 molding machine, to mold four sides at once .....	800
	<hr/>
	5, 750

**For shipsmith's shop:**

1 single standard steam hammer, 800 pounds falling weight .....	\$1,500
1 reverberatory heating furnace .....	1,000
Rearrangement of forges and rebuilding same, blocks and tools for angle and jobbing smith work .....	1,500
	<hr/> 7,000

**Miscellaneous:**

1 portable hoisting engine and boiler .....	1,000
Miscellaneous shafting and hangers for shops .....	2,500
Miscellaneous cranes, overhead tram rail system .....	8,000
	<hr/> 11,500

The following tools to be supplied ulteriorly:

**For ship fitters' shed:**

2 portable hydraulic riveters with cranes to close 1-inch rivets, 30-inch gap, at \$3,500 .....	7,000
1 hydraulic frame setting machine .....	2,500

**For machine shop:**

1 engine lathe, 84-inch swing, 30-foot bed .....	5,000
1 engine lathe, 30-inch swing, 18-foot bed .....	2,000
1 shaping machine, 12-inch stroke, 2 tables .....	1,300
2 Gooseneck drills, 1-inch capacity and 20-inch table, at \$300 .....	600
1 portable drilling machine, No. 4 .....	350
Miscellaneous small tools .....	3,000
1 emery-wheel tool-grinder, 36-inch wheel .....	600

**Wood working machinery:**

1 hand-saw mill .....	\$7,500
1 timber dressing machine, capacity 16 by 14 inches .....	2,000
1 smoothing planer, to plane 26 inches wide .....	550
1 tenoning machine .....	700
1 wood-turning lathe, 24-inch swing .....	400
1 wood-turning lathe, 18-inch swing .....	350
1 column jointer and hand planer .....	250
	<hr/> 34,100

**Miscellaneous:**

1 testing machine, capacity 100,000 pounds .....	2,500
Electric motor plant for portable drills and lighting ships .....	10,000
1 steam hammer, single standard, 500 pounds falling weight .....	1,000
1 portable boiler and wrecking pumps .....	1,500
	<hr/> 15,000

**5. Building slips and scive board sheds.**

The preparation of a slip on the site of the *Mohican* slip would be very desirable, so that a ship, if ordered, could be commenced at once.

<b>For piling, blocking, staging, derricks, etc.</b> .....	\$20,000
<b>A scive board shed, of inexpensive character should be built with strong floor for boards. The location to be as shown on the plan.</b> .....	4,000

**B.—ULTERIOR IMPROVEMENT.**

A list of tools to be purchased ulteriorly has been given above for convenience in connection with other tools.

<b>Two additional slips and blocking to be built on the sites indicated. For the part of the construction coming under the cognizance of the Bureau of Construction and Repair</b> .....	\$10,000
<b>To build a small foundry for iron and brass castings in the location shown on the plans, and equip with cupola, brass furnaces, etc.</b> .....	8,000
<b>To refit tinner's, coppersmith's, and plumber's shops, and build galvanizing plant.</b> .....	3,000
<b>To rearrange woodworking plant in building 40.</b> .....	2,500
<b>To rearrange sawmill</b> .....	2,500

**C.—IMPROVEMENTS NOT COMING UNDER THE COGNIZANCE OF CONSTRUCTION AND REPAIR.**

No estimate has been made upon these. Some of them are of immediate importance.

*Immediate improvements.*

Objects.	Estimated cost.
1. Bending slabs, angle and plate furnaces .....	\$28,000
2. New wooden building for Corliss engine .....	4,000
3. Erection of shed, foundation, tools, and shunting .....	40,000
4. Machine and power tools .....	96,200
5. Building slips and scurve board shed .....	24,000
Total immediate improvement .....	192,200

*Ultior improvements.*

Objects.	Estimated cost.
Machine and power tools .....	\$48,100
Additional slips and blocking .....	40,000
Foundry and equipment, refitting timber's, plumber's, and copper-smith's shops, and building galvanizing plant .....	11,000
Rearrangement of woodworking plant in building No. 40, and sawmill, building No. 42 .....	5,000
Total ultior improvements .....	105,000

The above recommendations are made under the supposition that this navy-yard is to be thoroughly equipped as a building yard for modern vessels. As the only navy-yard possessed by the Government on this coast, it is of the utmost importance that it should be thoroughly equipped, and that it should possess an efficient body of workmen attached to the yard. In the situation of the yard this can only be obtained by providing steady work for the mechanics, such as is involved in the construction of new vessels in various stages of completion. The best workmen cannot be expected to remain where they can obtain only desultory employment, such as is afforded by occasional repair work.

Very respectfully,

J. H. LINNARD,  
*Naval Constructor, U. S. Navy.*

Rear-Admiral JOHN IRWIN, U. S. Navy.  
*Commandant Navy Yard, Mare Island, Cal.*

COMMANDANT'S OFFICE,  
*Navy Yard, Mare Island, Cal., August 29, 1892.*

Approved and forwarded to Bureau.

JOHN IRWIN,  
*Rear Admiral, Commandant.*

# REPORT OF THE CHIEF OF THE BUREAU OF STEAM ENGINEERING.

NAVY DEPARTMENT,  
BUREAU OF STEAM ENGINEERING,  
*Washington, October 15, 1892.*

SIR: In obedience to your order of July 19, I have the honor to submit to the Department the annual report of this Bureau, together with estimates, for the fiscal year ending June 30, 1894.

## APPROPRIATION, STEAM MACHINERY, 1892.

Amount appropriated for the fiscal year ending June 30, 1892: act approved March 2, 1891.....	\$700,000.00
Expended to October 1, 1892:	
Labor in the navy-yards and stations in repair of steam machinery, boilers, etc., of naval vessels fitting for sea service, and preservation of tools, handling and preservation of materials, stores, etc.....	\$361,680.69
Purchase of materials, stores, machine tools, freight, and incidental expenses.....	233,630.21
Payments for repairs, materials, freight, and incidental expenses on foreign stations.....	71,463.04
Total.....	666,774.04
Less repayments by transfers in the adjustment of appropriations.....	11,953.28
Total expenditures.....	654,811.00
Balance on hand.....	18,168.91
Obligations of the Bureau to be paid from this balance:	
Approved requisitions unfilled (estimated).....	5,754.40
Unfilled contracts, orders, and reservations.....	31,201.51
Total obligations.....	37,015.91
Balance remaining to the credit of the appropriation.....	11,112.43

## GENERAL OPERATIONS OF THE BUREAU.

During the last year the Bureau has prepared plans and specifications for triple expansion engines and boilers for the United States revenue cutters *Hamilton* and *William Windom*, in accordance with the request made to the Department by the Secretary of the Treasury. Designs and specifications for new boilers for the U. S. S. *Michigan* have been prepared, and the boilers are now being built by contract in Buffalo, N. Y. Since the

passage of the naval appropriation bill in July last the Bureau has prepared plans and specifications for the motive machinery of the large armored cruiser provided for by that act, and has the designs for the machinery of the battle ship No. 4 well in hand. The main boilers being designed for this battle ship are the largest structures of the kind yet undertaken in this country, being 16 feet 9 inches in diameter and about 20 feet in length; they will be built of steel plates  $1\frac{3}{4}$  inches in thickness. New propelling machinery (triple expansion) has been designed for the tug *Nina*, and the work of constructing it has been authorized and will soon be undertaken at the New York navy-yard. By making temporary repairs to her boilers and engines the vessel will be kept in service during the time that the new machinery is building. During the year many detail drawings of the machinery of the *Cincinnati* and *Raleigh* have been prepared; also details of auxiliary machinery and for alterations and repairs of machinery in service.

Besides the foregoing the Bureau has projected new triple-expansion machinery for the *Chicago* and *Dolphin*, the latter being undertaken to transform this vessel from a dispatch vessel into a gunboat, for which change the present unprotected machinery is unsuitable. It is estimated that new triple-expansion engines, complete with new boilers, will cost about \$125,000. Probably enough of the old machinery can be utilized to bring this down to about \$100,000. This estimate is based on providing the same horse power (2,300) that she now has. The old boilers can not be retained as they do not carry high enough steam pressure for triple-expansion engines.

It is not likely that the boilers of the *Chicago* can be depended upon for more than three years (or one cruise) longer, and it is none too soon to consider the question of replacing them. The *Chicago* has been in constant and very active service since her completion, and the consequent wear and tear upon her boilers has been as great as that of two or three cruises of the older type of ships, which performed their voyages mostly under sail. The hull of this vessel is of excellent design and in first-class condition and she is, therefore, well worth fitting with modern machinery. The present boilers are externally fired with brick furnaces; a type that has some merits, but whose great weight for the power developed renders its use on a modern ship of war inadmissible. The engines are compound beam engines; a type that is also heavy, unsuitable, and out of date.

The machinery of this vessel weighs, in steaming condition, about 1,042 tons and occupies fore and aft in the ship a length of 142 feet; the greatest horse power ever developed by it was 5,248 and the speed of the vessel slightly over 15 knots.

The machinery in one of the newer vessels of the Navy has developed 8,800 horse power on a weight of about 750 tons in steaming condition and a space fore and aft in the ship of 130 feet; in other words, nearly 70 per cent more power than the *Chicago*, on more than 25 per cent less weight, and a space occupied fore and aft less by 12 feet. Similar machinery to this can be fitted in the *Chicago*, and will give her an increase of speed of nearly 3 knots, as well as an increased carrying capacity of nearly 300 tons.

To decrease the weight of the machinery of a vessel to that necessary for the safe production of the power desired means more than merely additional weight or space available for something else; it means also that the needless expense of freighting unproductive dead weight around the world is avoided, and this expense in the case of a vessel like the *Chicago*, will soon amount to a very considerable sum.

In view of the foregoing it will, in my opinion, be extremely unwise to furnish the vessel with new boilers and allow the present engines to remain in her. It is believed that machinery to develop 8,800 horse power can be built for between \$500,000 and \$600,000; probably for \$500,000, if suitable old material on hand in some of the navy-yards is utilized, as well as parts of the present machinery, such as pumps, blowers, line shafting, etc. I therefore recommend that an appropriation of \$200,000 be asked for to begin the construction of new machinery for this vessel, either by contract or at the New York navy-yard; work to be commenced as soon as the appropriation is available. When completed, probably about two years from commencement, the vessel can be laid up to have it erected on board, and her services thus lost for a comparatively short time only.

Referring again to the subject of new machinery for the *Nina*, I wish to state that the estimated cost of it, if procured by contract, was nearly \$30,000, but by utilizing some parts of the present machinery, as condenser, pumps, shafting, etc., and much suitable material now lying useless in the various navy-yards, as old cast-iron guns, brasses, propellers, etc., it has been found that it can be constructed in the New York navy-yard for about \$16,000. If the hulls of some of the larger of the old tugs—the *Leyden*, *Fortune*, and *Standish*—are in good enough condition to warrant it I suggest to the Department the advisability of building new machinery for them and thus making them useful for navy-yard work for many years to come, especially as the cost of machinery will be much less than the cost of new tugs which will, otherwise, before long be necessary.

#### WEIGHT OF MACHINERY.

In a previous report the Bureau called attention to the dangerously low limit of weight of naval machinery approached by modern designers, the tendency being to sacrifice weight, and with it safety, for the sake of producing machinery that will on the measured mile develop more horse-power per ton of weight than ever produced before. Although approaching near enough to the danger line in this matter to meet the requirements of other bureaus, this Bureau in its machinery designs has not cut the weights down below that really necessary for strength and safety, as has been done in some other countries, and, as a consequence, our machinery has been subjected to some adverse criticism as being comparatively heavy. All of our machinery thus far completed, however, has successfully withstood the full-power trials and the conditions of active service, and can be relied upon in any emergency that is likely to arise, while some of the foreign navies have experienced many serious breakdowns of machinery due entirely to structural weakness inherent in the design, and not the fault of the builders.

In the report above referred to, I said that we could design and build machinery just as light as anybody else's, and that it would run as well and as long as theirs, but that sooner or later such machinery would fail, when most needed, on account of its own weakness. So well is this opinion sustained by the recent experiences of the British cruiser *Aurora* that I will quote in full an article on the subject which appeared in the journal "Industries," London, August 19 last:

**A well-ordered and well-maintained navy, strong both in *matériel* and *personnel*, is absolutely essential to the well-being of this country. It is also equally essential that perfect reliance should be placed in its component parts in an emergency, and that each individual ship when called upon should be able to fully and satisfactorily**



meet the requirements for which she was designed, particularly with regard to speed and endurance under steam. These special qualities can only be maintained so long as everything goes well with the machinery and boilers, but, unfortunately, breakdowns of these vital elements are not of unfrequent occurrence, and vessels of the most modern types, engined by the most eminent firms in the country, fail at the critical moment when all the power that it was intended to develop is needed. For some of these failings the Admiralty double-ended boiler has been held responsible, and justly so, but in other instances the desire to attain maximum results has induced designers to cut down the weights of the machinery, and this has been carried beyond the limits of prudence, in fact, to such an extent that a point has been reached far below what is absolutely necessary for strength and safety. As a consequence, the engines in actual service have proved a constant source of anxiety to those intrusted with their charge. The defects developed in the first-class armored cruiser *Aurora*, of which we give an illustration above, point definitely enough to the fallacy of economizing weight too rigidly in the engine room, and the utter uselessness of ships which only obtain the contract speed and power for a short time instead of fulfilling under ordinary conditions of service the steaming capabilities they were originally intended to perform.

The *Aurora* is practically a new vessel. She was commenced at Pembroke dockyard in February, 1886, launched towards the close of 1887, and completed in 1889, at a cost of £281,550, out of which £64,000 was paid for machinery supplied by Messrs. J. and G. Thomson, of Clydebank. Her length is 300 feet between perpendiculars, breadth, 56 feet, and when fully equipped she has a displacement of 5,600 tons. The engines, which drive twin screws, were designed to realize 8,500 horse power with forced draft, and to propel the vessel at a speed of 18 knots. Ever since her completion, difficulties more or less serious have been experienced in the engine room, principally through defects which revealed themselves in the pistons and piston rods. Last summer new pistons were supplied by Messrs. Sir William Armstrong, Mitchell & Co., Newcastle-on-Tyne, and the work of fitting the same was carried out by the dockyard employés at Davenport. Previous to resuming her station with the channel squadron, she was subjected to trial, and it was anticipated that no further defects of a serious character would be developed. Her commission, however, was destined to be a brief one, as, in endeavoring to fulfill a full-power natural-draft trial in the Mediterranean in March last, a lamentable breakdown occurred through the bending of the piston rods; the trial had to be abandoned, and finally she was sent to England and paid out of commission at Davenport to undergo thorough repairs. New piston rods of increased diameter have been made at the Keyham engineering establishment, and other important modifications are at present being effected in the valve gear, feed pumps, etc. With stronger piston rods and the other alterations adopted, it is to be hoped that the machinery will be perfectly reliable in future, and that the steaming capabilities of the *Aurora* will, at least, be equal to the rest of her class. Her previous failures are, indeed, to be regretted. The blame seems to rest, however, with the designers, and not with the makers, of the machinery. We hope that the experiment of reducing weight beyond the limits of safety in the *Aurora's* engines, costly as it has been, will not be without good effect in future designing. The repairs to the *Aurora* are nearing completion, and we await with interest her forthcoming trials.

The general use of steel forgings and castings for the important parts of a marine engine in place of the heavy iron forgings and castings formerly used, the abandonment of the old cast-iron, box-shaped condensers, the adoption of hollow shafting, and many other improvements have all contributed towards lightening our machinery, but there is a limit beyond which it is not prudent to go, even with greatly improved material; and it is surely better to carry the necessary weight in the engines than to be constantly called upon to repair serious breakdowns, not to mention the risk of a dreadful calamity involving loss of life and property of enormous value. Another thing to be borne in mind is the fact that we can not approach as close to the limit of strength in marine engine design as is possible in designing structures on shore. A steel bridge and a marine engine may have to resist the same load or bear the same work, but the factor of safety used in proportioning the parts of the statical structure would be much too small in designing the engine, because the work of the latter is done under very different conditions. Not only are the parts of the engine in active motion themselves, but the foundation upon which it rests is necessarily yield-

ing and unstable, facts that subject the various parts to many variable and severe strains. A rod or bolt which in a bridge will resist a certain load with absolute safety would, if introduced into a marine engine to bear an exactly similar load statically considered, have to be considerably strengthened by increasing its size and consequently its weight.

In regard to the matter of steel castings, I am glad to be able to report that we are now having less trouble in obtaining them, showing that considerable experience has been gained and progress made in this art since we first began trying to get such work done for our new engines. That there is still considerable room for improvement in the art of making steel castings is shown by the following experience:—The Bureau recently sent two designs for engine columns—one a modified form of box-girder, the other a form of I-beam—to four of the most prominent steel casting establishments in the country, asking which of the two forms was regarded as the simpler to cast. One firm reported that it could cast either without difficulty; another said that it could cast the I-beam, but that the girder was impossible; the third firm offered to make the girder but not the I-beam, saying that the latter was a form that no one could make, while the fourth establishment claimed that both forms were impossible to cast in steel.

#### WORK DONE ON THE MACHINERY OF NAVAL VESSELS.

The following statement shows, briefly, the nature of the work done on the machinery of all vessels, whether in commission, laid up for repairs, or in ordinary, during the fiscal year ending June 30, 1892. The cost of the work, together with that of stores and outfits, will be found in the succeeding tabular statement.

*Adams*.—The navy-yard force at Mare Island rebored both cylinder liners, made and fitted new low-pressure follower plate, trued up piston rings, fitted new cross-tail, and fitted main bearing brasses; overhauled eccentrics and straps, valve, and reversing gear, and reversing gear rockshaft; fitted new tube sheets to condenser; refitted lignum vitae strips to stern tube, and propeller to shaft; lined engine and secured holding-down bolts; connected up air, circulating, bilge, and feed pumps, and made numerous repairs to small gear about engine; overhauled launch machinery; patched boilers and steam drums; renewed several tubes and calked leaks; repaired smoke-pipe and renewed bridge-walls; made new furnace door frames and renewed angle iron on boiler saddles. Ship was commissioned March 23, 1892, since which time there has been the usual examinations and overhauling incident to the service.

*Ajar*.—Preservation of machinery; repairs incident to service have been made to steam launch machinery.

*Alarm*.—Preservation of machinery.

*Alert*.—Fitted and made adjustments to crank-pin and main bearing brasses; tested condenser; overhauled air, circulating, feed, bilge, and auxiliary pumps and ash hoist; renewed distiller coils; calked leaks in boilers; strengthened castings of bridge-walls, and made minor repairs to engines, boilers, and auxiliaries. Ship in continuous commission; in dock May, 1891.

*Alliance*.—Aligned pistons and crossheads; adjusted main and other bearings, and eccentrics and straps; made usual examinations of important parts; overhauled air, circulating, feed, bilge, and auxiliary pumps; calked seams of boilers and re-expanded some tubes; patched one boiler and repaired air duct. Ship in continuous commission; docked September, 1890.

*Amphitrite*.—Preservation of machinery. Workmen at the Norfolk navy-yard fitted and adjusted high pressure cut-off valve; altered uptakes to facilitate fitting armored grating in smoke-pipe.

*Atlanta*.—Examined pistons and valves; white metallized crank-pin brasses; made new stems and refitted valves of reversing engine; overhauled cylinder relief valves; made usual examinations and overhaulings of main and auxiliary machinery incident to continuous service. Calked leaks and re-expanded tubes in all boilers, and made other minor repairs. The force at the New York navy-yard fitted new keys and screws to arms of air and circulating pumps; secured clutch coupling keys in pl

fitted new jacking wheel; made and fitted new valve stems to high pressure valves; fitted bleeder to main steam pipe; made repairs to air-tight casing; fitted internal feed pipes in all boilers; retubed one boiler; fitted soft patches in furnaces and on fronts of boilers where required. Ship in continuous commission; in dock June, 1892.

*Baltimore.*—Fitted or made adjustments to eccentrics, valve gear, cross-heads, crank-pins, and main journal brasses; strengthened ribs of port intermediate cylinder casing by composition knee pieces; made repairs and adjustments to cylinder relief valves, and to reversing engines; overhauled and examined important parts, and made many minor repairs to machinery and auxiliaries. Scaled boilers, and replaced zincs; calked leaky seams, stay bolts, and reexpanded leaky tubes; generally overhauled steam launch and whaleboat machinery. Workmen at Mare Island navy-yard refitted piston shoes; also, metallic packing to high pressure piston rods; retubed main and auxiliary condensers, and fitted zincs to former; overhauled valve gear and reversing shafts; adjusted and lined up starboard circulating pump; made and fitted new distiller coils, and repaired injection and other pipes; overhauled and put in good condition all auxiliary pumps; patched one boiler, replaced several tubes, and refitted manhole plates to two boilers. Ship in continuous commission; in dock January, 1892.

*Bennington.*—Examined important parts; overhauled and adjusted crank-pins, cross-heads, and other bearings; usual overhauling of auxiliaries incident to service. Calked seams of boilers; replaced some tubes, and reexpanded others. Contractor's men made alterations in air and circulating pumps; force at the New York and Norfolk navy-yards fitted new arm to rockershaft of air pump; overhauled evaporators, distillers, and heaters; made changes and put in several new valves in auxiliary piping; fitted deck lifts to safety valves. Machine shop at Montevideo made slight repairs to main steam pipe and steering engine; furnished new grate bars for boilers. Ship in continuous commission; docked November, 1891.

*Boston.*—Examined pistons, rings, springs, etc., and replaced springs where required; adjusted main and crank-pin bearings, links, eccentrics, and indicator gear; work of various kinds was done upon air and circulating pump connections, auxiliary and flushing pumps, gun-turning and steering engines, ice machine, blowers, capstan engine, and steam launch machinery; retubed auxiliary condenser. Repairs to air and circulating pump connections were made by the Morgan Iron Works of New York, and machine shop at Bahia, Brazil. Overhauled valves on boilers, and replaced small piping in places; replaced patent grate bars in one boiler; calked seams, reexpanded tubes, and made minor repairs to all boilers; retubed one boiler; scraped and painted double bottoms. The force at the New York navy-yard repaired main stop valve, and renewed section of steam pipe; repaired valves of reversing engine; fitted expansion joint in receiver pipe, and altered steam piping to cylinder relief valves. Workmen at the Mare Island navy-yard made alterations to water valves of low pressure cylinders; secured high pressure eccentrics to shaft; renewed and rearranged air and circulating pump connections; retubed seven boilers; fitted patches and renewed rivets where necessary; put new floor plates in fire rooms, and renewed flanges and rivets in bottom blow pipes through hull. Ship in continuous commission; in dock June, 1892.

*Camanche.*—Preservation of machinery. The force at the Mare Island navy-yard put engine and boilers in condition for trial; machinery worked satisfactorily.

*Canonicus.*—Preservation of machinery.

*Catalpa.*—The force at the New York navy-yard made miscellaneous repairs to engine.

*Catskill.*—Preservation of machinery.

*Charleston.*—Aligned pistons; refitted or adjusted crank-pin, crosshead, and main bearing brasses; renewed several packing rings of main valves, and readjusted others; fitted rings to thrust bearings; overhauled reversing, indicator, and cylinder water valve gear; also, stop, throttle, and other valves about engines; made usual examinations of all principal parts of main machinery, and minor repairs where needed; overhauled air, feed, bilge, and auxiliary pumps and machinery; replaced piping to hydraulic steering gear, and repaired accumulator; refitted running parts of whaleboat engine, and overhauled steam launch machinery. Cut out and replaced some tubes in boilers, and reexpanded others; calked leaky seams, and fitted liners to furnace doors; repaired top of combustion chamber of auxiliary boiler, and put in additional stays; worked for other departments of the ship on various jobs. The navy-yard force at Mare Island overhauled outboard valves; repaired main injection and other piping; rebored water cylinder of flushing pump; calked seams, replaced several tubes in boilers, and made other small repairs in the department. Ship in continuous commission; docked January, 1892.

*Chicago.*—Refitted crank shaft, beam center, and other brasses; overhauled valve gear and reversing engines; aligned crossheads; re-secured core plugs in all main pistons, and replaced one; made adjustments, examinations, and overhaulings of

principal parts of main machinery refitted in parts, or repaired; auxiliary pumps, blowers, ventilating engines, jacking, anchor and steering engine, and ash hoists; also evaporators, distillers, and heaters; overhauled steam launch and whaleboat machinery; checked seams of boilers; reexpanded and replaced several leaky tubes; renewed furnace door lugs, dead plates, and repaired furnace brickwork; made alterations for gunboats, and did various other work for Ordnance Department. Norfolk navy-yard force made and fitted new guides for crosshead of high-pressure engine; put in and calked boilers, and made other slight repairs. Workmen at the New York navy-yard repaired main exhaust and auxiliary piping; put in and connected engine room ventilating engines, and fitted new evaporators; repaired reversing gear and renewed rivets, calked seams, and did other work about boilers. Ship in continuous commission; in dock June, 1892.

*Cohasset*.—Slight repairs to boiler were made by force at the Portsmouth navy-yard.

*Coward*.—Overhauled pistons, rings, and springs; adjusted indicator gear, crank pin, cross-head, and main journal brasses; overhauled ash hoists, auxiliary and flush pumps, and other auxiliary machinery. Calked seams and repaired small gear about boilers; reexpanded several tubes and put four new tubes in one boiler. Workmen from Davidson Pump Works made repairs to circulating pump, and put in additional braces. A new bracket for beam shaft bearing of port air and circulating pump was made and fitted by machine shop at Bahia, Brazil. The force at the New York navy-yard made repairs to main steam pipes; repaired ventilating engine; rebrazed several pipes, and fitted additional braces to boiler tube sheets; calked and reexpanded tubes in boiler. Workmen at the Boston navy-yard overhauled rock-shafts of air and circulating pump, reversing gear of starboard engine, and repaired pipes to auxiliary pumps; also fitted two spare blades to starboard, and one to port propeller. Ship in continuous commission; docked June, 1892.

*Cushing*.—Fitted new springs to main valves; tested high-pressure cylinder heads by hydraulic pressure and ground them on cylinder; replaced springs on valves of feed pump; made usual examinations and overhauls of main and auxiliary machinery. Tested boilers; repaired water gauge connections and corrected steam gauges; fitted new zincs and overhauled valves about boilers. Yard workmen at New York repaired cover of port receiver; fitted several new valves and repaired auxiliary piping. Washington navy-yard made and put in place crosshead guide for starboard engine, and made spare heads for steam cylinder of air pump. Ship was hauled out on ways at Newport, R. I., and put out of commission November 11, 1891; re-commissioned January 11, 1892.

*Dale*.—The navy-yard force at Washington made repairs to heating apparatus.

*Despatch*.—Slight miscellaneous repairs to machinery were made at the Washington navy-yard.

*Dolphin*.—Workmen at the Norfolk navy-yard adjusted pillow blocks of thrust shaft and main bearing brasses; refitted crank-pin and crosshead brasses; calked seams of boilers and fitted several patches; painted parts of boilers and smoke pipe; put in place and connected up distiller pump and evaporator; overhauled all auxiliary machinery. Ship placed in commission March 14, 1892; in dock May, 1892.

*Emerald*.—Workmen at the Portsmouth navy-yard made various repairs to engine.

*Enterprise*.—Refitted crank-pin brasses; overhauled and adjusted main and cut-off valve gear; overhauled air, circulating, feed, and bilge pumps; sealed boilers and fitted washers and plugs to several leaky tubes; fitted patch in back connection of one boiler; tested all steam gauges, and made minor repairs to valves and pipes about boilers. Docked September, 1890; placed out of commission at Annapolis, Md., October 2, 1891. Used for practical exercises at the Naval Academy.

*Essex*.—Refitted liners to piston shoes; smoothed scores in low pressure cylinder by scraping; readjusted arm on rock shaft of reversing gear, and overhauled eccentrics; made usual examinations, adjustments, and overhauls of important parts of engine, boilers, and auxiliaries. Ship in continuous commission.

*Fenn*.—Refitted crank-pin and crosshead brasses; scraped cylinders and rings; examinations and overhauls were made of air, bilge, and feed pumps, pipework, valves, etc., about engine and boilers. The navy-yard force at Norfolk removed and replaced three soft patches, calked flues, socket bolts, and seams of main boilers; fitted new nuts to braces, and renewed grate-bar supports; replaced auxiliary pump by new one. Ship in continuous commission, docked December, 1891.

*Fortuna*.—Boilers were repaired by force at New York navy-yard.

*Franklin*.—Dis-connected and removed hoisting section and hoisting gear of smoke-pipe; fitted three patches to starboard auxiliary boiler, and replaced five braces; made many minor repairs incident to distilling water and heating ship; also to the machinery of two-steam launches. The navy-yard force at Norfolk made new crank-pin and fitted 1 grain vite bushing to stern bearing of steam launch.

*Hartford*.—Preservation of machinery.

*Troquois*.—Made usual examinations and adjustments of engines and auxiliaries; boilers were extensively patched in furnaces and back connections, and many

reexpanded; piston rod of after engine broke at sea while en route from Honolulu to San Francisco, and ship steamed with one engine. Put out of commission at Mare Island, May 12, 1892.

*Ivy*.—Engines and boilers were overhauled and put in good condition by yard force at Mare Island.

*Iwana*.—Repairs were made to auxiliary machinery at Boston navy-yard and to main engine at the New York yard.

*Jamestown*.—The force at Norfolk navy-yard made repairs to heaters, piping, and boilers.

*Jason*.—Preservation of machinery.

*Kearsarge*.—Cleaned and adjusted piston rings, springs, and main valves; overhauled valve gear; trued up crosshead pin; fitted wearing strips to crank-shaft brasses, and liner to crosshead guides; overhauled cylinder relief valves; removed and replaced leaky tubes in condenser; overhauled circulating, air, and auxiliary pumps; examined and cleaned outboard valves. Scaled boilers, and calked seams; re-expanded and ferruled tubes; repaired furnace doors; overhauled water gauges, sentinel, and safety valves. The force at the Portsmouth navy-yard refitted indicator and counter gears; made repairs to main bilge suction, and to auxiliary pump suction pipe; fitted set of crank-pin brasses to ash-hoisting engine. Ship in continuous commission; docked June, 1892.

*Launcester*.—Engineer's force made usual examinations of important parts of engine, and overhauls incident to service; aligned pistons, and adjusted main valves, and eccentrics; repaired port-blower engine; overhauled air, circulating, feed, and bilge pumps; made constant repairs to boilers. Ship in continuous commission.

*Lehigh*.—Preservation of machinery.

*Leyden*.—Boilers were repaired by the force at the Portsmouth navy-yard.

*Mahopac*.—Preservation of machinery.

*Manhattan*.—Preservation of machinery.

*Marion*.—Examined important parts; frequently overhauled and repaired reversing engine and gear; made adjustments to crank-pin, crossheads, and other bearings; overhauled and repaired air, circulating, feed, and bilge pumps; calked seams of boilers, reexpanded many tubes, and replaced many leaky ones. Repairs were made by shore party at Yokosuka, Japan, to steam pipe connection to high-pressure starting valve, bed-plate of reversing engine rock shaft, clutch coupling, stern bearing, and shaft brake. In continuous commission; docked April, 1892.

*Mayflower*.—Slight repairs to engine were made by force at the Norfolk navy-yard.

*Miantonomoh*.—Made usual examinations of principal engine details; overhauled and adjusted crank-pin, crosshead, and main journal brasses; also eccentrics and straps, and reversing engines and gear; tempered springs of main pistons, and made minor repairs to pumps and auxiliary machinery; calked leaky seams of boilers and remade many joints in fire-room piping. The force at the New York navy-yard made repairs to air pump, ran pipe connections to capstan engine, and altered piping to auxiliary pump; fitted ventilating ducts in engine room, steam trap, and separator for dynamo, and speaking tubes; overhauled anchor and turret engines; also, air ducts in fire rooms, and battle plates in ventilators; fitted new manhole plates to boilers, and cemented double bottoms. Ship was commissioned October 27, 1891; in dock February, 1892.

*Michigan*.—Overhauled pistons, rings, and springs; readjusted valve gear of port engine, and fitted main journal brasses; made repairs to indicator connections, and put in place a holding-down brace for frame of port engine; overhauled outboard journals, and replaced defective wheel bucket in starboard paddle. Cemented bottoms of boilers; calked leaks, and patched boilers in numerous places; repaired fire-room floor plates. Machine shop at Erie, Pa., made repairs to steam-launch engine. Ship in continuous commission.

*Minnesota*.—Preservation of machinery; put in place and connected three additional heaters; overhauled auxiliary pumps, and made minor repairs incident to heating ship, distilling, and for pumping purposes.

*Mohican*.—Examined important parts; overhauled pistons, rings, and springs; also, valves and gear, cylinder relief valves, air, circulating and other pumps; made minor repairs incident to service. Calked seams, rivets, and socket bolts of boilers; replaced leaky tubes, and reexpanded many others. The force at Mare Island navy-yard fitted new outboard delivery chamber and water-relief valves to cylinders; calked seams of boilers, and replaced some tubes; repaired bridge-walls, and retubed steam-launch boiler; fitted new auxiliary pump. Ship in continuous commission; in dock April, 1892.

*Monadnock*.—Work has been continued by the force at the Mare Island navy-yard on main pistons and valves, link blocks, eccentrics and reversing gear; fitting up various pumps, rods, pipes, and valves; building uptakes of boilers and smoke pipe; fitting internal plates, pipes, and valves to boilers.

**Monocacy.**—Made usual examinations, adjustments, and overhauls of important parts; repaired air and feed pumps; machine shop at Shanghai, China, made new piston rod, and trued up piston rings and follower plate; engineer's force fitted rod to piston and crosshead. Calked seams and leaky rivets of boilers, and made other minor repairs to engine, boilers, and steam launch. In continuous commission; docked September, 1891.

**Montauk.**—Overhauled all pumps, valves, etc., about machinery preparatory to steam trial; put indicator attachments in order; main engines and dependencies worked satisfactorily on trial; docked February, 1892.

**Nahant.**—Preservation of machinery.

**Nantucket.**—Preservation of machinery. The force at navy-yard, New York, fitted new packing ring to piston of starboard engine; made and put in place cut-off valve stem for port engine; removed superheaters. Calked seams of boilers; overhauled outboard valves, and packed all pumps and valves about machinery; raised steam and tried engines. In dock January, 1892.

**Narkeeta.**—The force at the New York navy-yard made repairs to engine and boiler.

**Nellie.**—The force at the navy-yard, Mare Island, thoroughly overhauled engine and constructed and fitted new boiler.

**Newark.**—Refitted shoes in two pistons, and readjusted springs and rings of all main pistons; made adjustments to main valve gear and valves; took up lost motion in indicator gear; tested main condensers, and renewed fifteen tubes which had split or corroded; made numerous minor repairs, adjustments, or changes about main engines and auxiliary machinery. Sealed boilers and evaporators; calked leaks, and renewed corroded boiler tubes; overhauled safety, sentinel, and stop valves; fitted new machinery to whaleboat and steam launch, and made new propeller shaft for latter. Yard workmen at Boston altered position of flushing and distilling pumps; fitted several sections of pipe to auxiliary pumps, and overflow pipe to feed tank; rearranged smoke pipe to auxiliary boiler, and replaced valves in steam pipe to reversing gear. The force at the Norfolk navy-yard fitted new suction pipe to auxiliary circulating pump, and changed lead of some auxiliary piping; fitted new furnace-door liners, and mouth-pieces to boilers; shifted evaporators, and made other slight repairs. Ship in continuous commission; docked June, 1892.

**New Hampshire.**—Repairs were made to heating apparatus by force at the naval station, New London, Conn.

**Nina.**—Repairs to machinery were made by the force at the New York navy-yard.

**Nipic.**—The force at the Mare Island navy-yard overhauled and assembled various parts of engine, and made repairs to boilers.

**Omaha.**—Preservation of machinery.

**Palos.**—Usual overhauls and adjustments of important parts; fitted new springs, and made repairs to piston; refitted backing eccentric and air pump links; overhauled condenser and auxiliary pumps; made constant repairs to main boilers; retubed auxiliary boiler, and fitted new tube sheet. Vessel was towed from Tongku, China, to Nagasaki, Japan, for general repairs.

**Passaic.**—Preservation of machinery. The force at the navy-yard, Norfolk, lined up main shaft, and adjusted brasses; overhauled main and cut-off valve gear, eccentrics and reversing gear; examined and put in order all outboard valves. Cleaned, sealed, and calked seams of boilers and made other slight repairs to prepare machinery for service.

**Pensacola.**—Made usual examinations, adjustments, and overhauls of important parts; overhauled air, circulating, feed, and bilge pumps, and made renewals and minor repairs. Calked leaky seams, rivets, and stay bolts of boilers. Yard workmen at Mare Island worked on leaky seams and stay bolts of boilers, and made repairs to furnaces and water bottoms. Ship was placed out of commission at Mare Island, April, 1892.

**Petrel.**—Frequently overhauled and refitted crank-pin and crosshead brasses, valve gear and connections, and reversing engine; repaired cylinder relief valves, and indicator gear; removed and replaced several tubes in condenser; examined important details, and made usual overhauling of engine, auxiliaries, and steam launch. Calked seams of boilers; re-expanded and ferruled some tubes; fitted new door liners and frames to several furnaces. The force at New York navy-yard overhauled and adjusted valve gear and eccentrics; partly renewed piping of feed, and flushing pumps; fitted new evaporator, and put in place distiller pump; replaced some defective tubes in boilers, and ferruled others; made repairs to air ducts. Machine shop at Port Said altered several floor plates, and fitted manhole plate to distiller room. In continuous commission; docked April, 1892.

**Philadelphia.**—Usual examinations, overhauls, adjustments and other work upon cylinders, pistons, valves and valve gear, crank-pins and crossheads; main bearings, thrust and stern bearings, air, circulating, bilge, feed, and other pumps and their connections; replaced fifteen leaky tubes in auxiliary condenser; repaired machine, ash hoists, steam winch, and main indicator gear; overhauled (

evaporators, etc., and made alterations in their piping. Calked seams of boilers, and replaced furnace door liners; fitted new zincs, and overhauled valves and air ducts about boilers; made numerous repairs to steam launch and whaleboat machinery. Workmen at the New York navy-yard made repairs to rock shaft of valve gear; altered gear for cylinder relief valves; remade joints of steam pipes, and altered lead of other piping; calked and patched butt straps of boilers; resecured uptakes, and fitted manhole plates; repaired furnace fronts. Contractors' men put ice machine in position, and made connections. Ship in continuous commission; docked June, 1892.

*Phlox*.—Engineer's force at the Naval Academy fitted a large number of patches to boiler; reexpanded many leaky tubes, and plugged others; made minor repairs to engine incident to service in Chesapeake Bay.

*Pinta*.—Adjusted and made repairs to main steam and exhaust valves; refitted link block, valve gear connections, and overhauled reversing gear; altered stuffing boxes of piston rods; repaired circulating pump, and overhauled air pump. Calked seams in back connections, and tested boilers; fitted dampers in front uptakes, and secured zincs in boilers; generally overhauled machinery of three steam launches. Ship in continuous commission; docked May, 1891.

*Portsmouth*.—Slight repairs made by force at the Portsmouth navy-yard to heating apparatus.

*Puritan*.—Preservation of machinery. Work of fitting forced draft system, and rearranging steam pipes has been continued by the force at the New York navy-yard. In dock May, 1892.

*Ranger*.—Ship went out of commission at the Mare Island navy-yard on September 14, 1891. Yard workmen disconnected and removed cylinders, and crank shaft to machine shop; removed cylinder linings, and fitted new ones; trued piston packing rings, and piston rods; made new low-pressure follower plate and link blocks; refitted eccentrics and straps, and overhauled reversing gear; rebored and fitted crank-shaft brasses, and made general repairs to small parts of engine, pumps, etc. Put in place and covered four new boilers, and connected uptakes, piping, valves, etc. Ship was recommissioned April 26, 1892; repairs have since been made at Seattle, Wash., to high-pressure cut-off valve, and piston-rod packing; low-pressure jacket packing ring, clutch coupling, and other small parts.

*Richmond*.—Preservation of machinery; made repairs incident to running ventilating engines, distilling plant, and heating ship; also, kept in order three steam launches attached to training station.

*Rocket*.—Boiler has been overhauled and put in good condition by the force at the Boston navy-yard.

*San Francisco*.—Overhauled main pistons, and frequently aligned various parts of engines; made usual examinations, adjustments, and overhauls of important details; replaced corroded tubes in main condensers, and fitted baffle plates; scraped and fitted brasses of crank-pins, crossheads, and other parts; made repairs to air, circulating, feed, bilge, and other pumps and auxiliaries incident to service; overhauled and repaired machinery of steam launch and whaleboat. Calked seams, and overhauled valves, piping, etc., about boilers; forced bulge in furnace flue of auxiliary boiler into place, and fitted patch. Yard force at Mare Island made repairs to main feed and flushing pumps; retubed auxiliary condenser and overhauled its pumps; calked boilers; repaired furnace fronts and doors; patched auxiliary boiler, renewed many tubes, and fitted additional braces; altered battle gratings, and did other minor work. Machine shop at Callao, Peru, made slight repairs to port high-pressure valve gear. Ship in continuous commission; docked November, 1891.

*Standish*.—Engineer's force at the Naval Academy repaired piston springs; overhauled valve and reversing gears, and made repairs to steam piping; refitted crank-pin and crosshead brasses; fitted strainer over bilge suction. Patched boilers and renewed bolts securing uptakes; made other repairs incident to service; docked October, 1890.

*Suvarov*.—Preservation of machinery.

*Tallapoosa*.—Made usual examinations and overhauls of important parts; calked, and fitted many patches to boilers. Vessels sold in January, 1892.

*Terror*.—Preservation of machinery.

*Thetis*.—Made usual examinations of important details; refitted crank-pin, crosshead, and other bearings; repaired indicator gear; overhauled condenser; also, air, circulating, and feed pumps. Renewed patch on boiler, and patched smoke pipe; replaced leaky tubes in main boiler. The navy-yard force at Mare Island refitted high-pressure valve gear; repaired bilge pump, and renewed lignum vitae strips in stern tube; patched main boiler, renewed some tubes, and replaced furnace door liners; replaced several floor plates in fire room. Ship in continuous commission; in dock December, 1891.

*Triton*.—The engineer's force made minor repairs incident to service.

*Vermont*.—General repairs incident to service have been made to machinery of

steam launches, ferry scow, and boilers and machinery on Cob dock used for running electric plant, heating ship, etc. Renewed defective heater piping on receiving ship, and made and put in place several return bend heaters; tested a Baird's evaporator.

*Tourides*.—Made usual examinations and adjustments of important parts; overhauled eccentric rocker arms and links, valve rods, valve gear, and renewed broken bolts; refitted crank-pin and cross-head brasses; tested condensers; made repairs to, or overhauled, all auxiliary machinery, including dynamo engine and air compressors; extended water-service pipes. Sealed and painted boilers; calked seams, rivets, and rebeaded or reexpanded many tubes. Yard workmen at New York, Washington, and Norfolk, repaired hydraulic piping; fitted floor plates in engine room and doors to furnaces of boilers; calked leaks, and made other slight repairs. Cylinder of feed pump in fire room was replaced by contractors. Ship in continuous commission; docked November, 1891.

*Wabash*.—Preservation of machinery. Made many repairs to auxiliary boilers, and pumps incident to heating ship, pumping, etc.

*Wabnet*.—Slight repairs and adjustments to engine have been made by the force at the Norfolk navy-yard.

*Wyandotte*.—Preservation of machinery.

*Yantic*.—Adjusted eccentrics, and reset main valves; lined pistons, and replaced broken springs; made usual examinations, and overhauls of principal engine details, and incidental repairs to auxiliary machinery. Calked and tested boilers; replaced several tubes and reexpanded others. The force at the New York navy-yard repaired main shaft; overhauled and put condenser in condition; fitted new escape pipe, and worked on dry pipes of boilers. Ship in continuous commission; in dock September, 1891.

*Yorktown*.—Overhauled main valves and replaced several packing rings; fitted and adjusted crank-pin, crosshead, and other bearings; examined important parts; made adjustments to indicator and reversing gears; made numerous minor repairs to auxiliaries. Calked boilers, plugged several pitted tubes, and cut out and replaced others; renewed furnace frame linings and grate bars; overhauled valves, pipes, etc., about boilers. The force at the New York and Mare Island navy-yards calked seams, and replaced leaky rivets in boilers; renewed furnace door liners, and furnished spare set; replaced fire-room floor plates and strengthened supports; made repairs to feed, and auxiliary pumps and piping; fitted new injection valve, and made spare parts for several auxiliaries. Ship in continuous commission; docked March, 1892.

*Cost of work done under cognizance of Bureau of Steam Engineering for the fiscal year ending June 30, 1892, upon machinery, boilers, etc., with outfits, stores, etc., of naval vessels.*

Name of vessel.	Machin- ery, boil- ers, etc.	Outfits, stores, etc.	Total.	Name of vessel.	Machin- ery, boil- ers, etc.	Outfits, stores, etc.	Total.
Adams	\$15,543.08		\$15,543.08	Essex		\$1,298.02	\$1,298.02
Ajax and moni- tors		\$116.33	116.33	Fern	\$2,176.04	25.59	2,201.63
Albatross	414.77		414.77	Fortune	1,151.67		1,151.67
Alert	167.47	1,167.33	1,274.80	Franklin	667.90	134.97	822.87
Alliance	216.00	425.87	641.87	Galena	636.68		636.68
Amphitrite	2,991.50		2,991.50	Gunboats Nos. 5 and 6	6,990.70		6,990.70
Atlanta	5,075.06	1,108.48	6,186.54	Harbor defense ram*	2,162.50		2,162.50
Baltimore	22,175.17		22,175.17	Indiana	246.26		246.26
Baneroft	3,597.92		3,597.92	Iroquois		785.23	785.23
Bennington	1,596.13	1,124.47	2,720.60	Ivy	1,029.27		1,029.27
Boston	19,885.56	3,061.52	23,950.08	Iwawa	287.75	434.55	722.30
Camanche	785.29		785.29	Jamestown	323.10		323.10
Catalpa	1,172.71	42.50	1,215.01	Jason	573.09		573.09
Charleston	2,751.52	3,901.69	6,653.21	Kearsarge	304.03	187.20	491.23
Chicago	6,044.22	19,013.38	25,057.60	Launceston	124.19	1,928.27	2,052.46
Cincinnati	226,594.38		226,594.38	Leyden	2,218.76		2,218.76
Cohasset		20.88	20.88	Maine	894.00		894.00
Concord	2,532.58	2,067.59	4,599.97	Marion	782.08	2,231.64	3,013.72
Cruiser No. 3	77.00		77.00	Massachusetts*	1,278.18		1,278.18
Cruiser No. 6	71.50		71.50	Mayflower	149.12		149.12
Cruiser No. 11	3,342.50		3,342.50	Michigan	9,478.94	612.85	10,091.79
Cruiser No. 12	4,405.56		4,405.56	Minnesota	196.41	16.14	212.55
Cruiser No. 13*	2,651.00		2,651.00	Mississippi	594.53	76.76	671.29
Cushing	846.86	352.27	1,199.13	Mohican	2,936.45	412.17	3,348.62
Dale				Monadnock	25,742.92	212.34	25,955.26
Deepwater	33.11		33.11	Montgomery	3,514.71		3,514.71
Detroit	3,456.47		3,456.47	Monongahela	734.75	1,245.46	1,980.21
Dolphin	7,395.51	587.69	7,983.20	Montauk		40.06	40.06
Emerald	313.88		313.88		1,838.33		1,838.33
Enterprise	16.21		16.21				

\* For copyists and draftsmen.



*Cost of work done under cognizance of Bureau of Steam Engineering for the fiscal year ending June 30, 1892, upon machinery, boilers, etc., with outfits, stores, etc., of naval vessels—Continued.*

Name of vessel.	Machinery, boilers, etc.	Outfits, stores, etc.	Total.	Name of vessel.	Machinery, boilers, etc.	Outfits, stores, etc.	Total.
Nahant .....	\$732.50		\$732.50	Richmond .....	\$1,242.85	\$10.36	\$1,253.21
Narkeeta .....	1,097.83	\$572.18	1,670.01	Rocket .....	529.60	5.01	534.61
Nantucket .....	4,341.34		4,341.34	San Francisco ..	4,313.87	5,092.84	9,346.71
Nellie .....	2,693.50		2,693.50	Standish .....	7.32		7.32
Newark .....	3,619.01	398.94	4,017.95	Tallahpoosa .....		461.84	461.84
New ferry boat ..	13,143.08		13,143.08	Terror .....	4,273.37		4,273.37
New Hampshire ..	426.50		426.50	Texas* .....	1,065.69		1,065.69
New York* .....	3,551.32		3,551.32	Thetis .....	2,569.67	195.32	2,764.99
Nipsic .....	3,483.23		3,483.23	Torpedo boat			
Nina .....	1,589.35	210.18	1,799.53	No. 2 .....	797.00		797.00
Oregon* .....	236.26		236.26	Triton .....	1,268.87	96.20	1,365.07
Palos .....	7.85	1,104.16	1,112.01	Vermont .....	111.91	122.58	234.49
Passaic .....	1,858.09	180.61	2,038.70	Vesuvius .....	1,534.03	512.98	2,047.01
Pensacola .....	656.16	18.90	675.06	Wabash .....	30.24		30.24
Petrel .....	5,296.63	4,392.41	9,689.04	Wahnetta .....	165.56	501.62	667.18
Philadelphia .....	14,106.70	446.11	14,552.81	Wyandotte .....	209.12		209.12
Pinta .....	72.50		72.50	Yantic .....	995.76	662.19	1,657.95
Portsmouth .....	20.88		20.88	Yorktown .....	7,448.16	2,613.73	10,061.89
Puritan .....	24,843.32		24,843.32				
Raleigh .....	241,550.50		241,550.50	Aggregate .....	782,411.26	60,109.30	842,520.56
Ranger .....	40,434.04		40,434.04				

\* For copyists and draftsmen.

#### PRESENT CONDITION OF THE MACHINERY OF NAVAL VESSELS, WITH THE WORK REQUIRED.

The following statement shows the condition of the machinery according to the latest reports, together with the work needed to fit the vessels for sea service or to keep them on duty or in readiness during the next fiscal year:

*Adams* (third-rate cruiser).—In commission on the North Pacific. Machinery has lately been overhauled, and is in good condition.

*Ajax* (single-turret monitor).—In ordinary near Richmond, Va. Machinery in fair condition; ventilating pipes from blowers are rusted out and useless; it would require about two weeks to put the machinery in condition for trial; for long service, a general overhauling would be necessary.

*Alarm* (torpedo ram).—In ordinary at the New York navy-yard. Condition good to fair; gearing of (Mallory) propeller has considerable lost motion due to wear.

*Alert* (third-rate cruiser).—In commission on the Asiatic station. Condition of machinery good to fair.

*Alliance* (third-rate cruiser).—In commission on the Asiatic station. Condition of engine good, of boilers fair.

*Amphitrite* (double-turret monitor).—In ordinary at the navy-yard, Norfolk. Condition of machinery and boilers good; sixty days required to fit machinery for sea service.

*Atlanta* (second-rate cruiser).—In commission with the Squadron of Evolution. Condition good to fair.

*Baltimore* (second-rate cruiser).—In commission on the Pacific station. Condition of all important details good.

*Bennington* (third-rate cruiser).—In commission on the South Atlantic station. Condition good.

*Boston* (second-rate cruiser).—In commission on the Pacific station. Condition good; machinery has recently been overhauled.

*Camanche* (single-turret monitor).—In ordinary at the Mare Island navy-yard. Condition of machinery good.

*Canonicus* (single-turret monitor).—In ordinary near Richmond, Va. Engines in fair condition; boilers and ventilating pipes from blowers defective; time required to fit machinery for service, thirty days after receipt of material.

*Catalpa* (tug).—At New York navy-yard. Machinery in fair condition.

*Catskill* (single-turret monitor).—In ordinary near Richmond, Va. Important details in good condition. With full force, the machinery could be made ready for sea in eight days.

*Charleston* (second-rate cruiser).—In commission on the Pacific station. Engine details in good condition; boilers need retubing.

*Chesapeake* (single-turret monitor).—In ordinary at the North Atlantic station. Condition of boiler, heaters, and pumps good; ten days with full force required to fit for sea.

*Conqueror* (tug).—At the New York navy-yard.

*Conrad* (torpedo ram).—Struck from the list March 9, 1892.

*Croaker* (single-turret monitor).—In process of construction at the Atlantic coast. Condition of machinery good.

*Delft* (sailing vessel).—Receiving ship at Washington, D. C. Condition of heating apparatus fair.

*Dolphin* (sailing vessel).—Struck from the list October 11, 1891.

*Dolphin* (sailing vessel).—Receiving ship at the Norfolk navy-yard. Machinery recently overhauled and in good condition.

*Emerald* (tug).—At the Boston navy-yard. Machinery needs overhauling and repairs.

*Enterprise* (double-turret monitor).—In process of construction at the Naval Academy, Annapolis, Md. Engine in fair condition; several boilers require new tubes, and auxiliary steam pumps need repair.

*Essex* (third-rate cruiser).—In commission on the South Atlantic station. Condition of engine and boilers good.

*Ferris* (fourth-rate vessel).—In special service running between navy-yards. Condition fair; machinery is old and not efficient.

*Fortune* (tug).—At the New York navy-yard. Machinery in fair condition.

*Franklin* (old-type frigate).—Receiving ship at the Norfolk navy-yard. Engine details require extensive repairs; main boilers condemned; auxiliary boilers for distilling water, heating ship, etc., in fair condition.

*Gaboon* (third-rate cruiser).—Sold May 9, 1892.

*Hartford* (second-rate cruiser).—At Mare Island navy-yard. Extensive repairs would be required to fit the machinery of this vessel for service.

*Independence* (sailing vessel).—Receiving ship at Mare Island navy-yard. Machinery of steam launch in fair condition.

*Intrepid* (torpedo ram).—Struck from the list March 9, 1892.

*Iroquois* (third-rate cruiser).—In ordinary at the Mare Island navy-yard. Engine details in fair condition; boilers are worn out.

*Ivy* (tug).—In service at the Mare Island navy-yard. Condition good to fair.

*Iviana* (tug).—At the Boston navy-yard. Machinery is new and in good condition.

*Jamestown* (sailing vessel).—Condition of boiler, heaters, and pumps supposed to be fair.

*Jason* (single-turret monitor).—In ordinary at the League Island navy-yard. Important details in good condition, except boilers need repairs; time required to fit machinery for sea, sixty days.

*Kearsarge* (third-rate cruiser).—In commission on the North Atlantic station. Condition good to fair.

*Launceston* (second-rate cruiser).—In commission as flagship of the Asiatic station. Machinery is in good serviceable condition, but of an old type.

*Lehigh* (single-turret monitor).—In ordinary near Richmond, Va. Condition of machinery good; ten days with full force required to fit for sea.

*Leyden* (tug).—At the Portsmouth navy-yard. Condition of machinery good.

*Malopac* (single-turret monitor).—In ordinary near Richmond, Va. Engine is in good condition, but boilers are unreliable, and require patching and new rivets in places; ventilating pipes from blowers are defective; after receipt of material to make needed repairs machinery could be made ready in thirty days.

*Manhattan* (single-turret monitor).—In ordinary near Richmond, Va. Engine in fair condition, boilers poor; time required to fit for sea, about thirty days; three months' time would be required to thoroughly overhaul machinery.

*Marion* (third-rate cruiser).—In commission on the Asiatic station. Condition of engine good, of boilers fair.

*Mayflower* (tug).—At the Norfolk navy-yard. Machinery is in poor condition.

*Maytown* (double-turret monitor).—In commission on the Atlantic coast. Condition of machinery good.

*Michigan* (fourth-rate paddle-wheel steamer).—In commission on the Great Lakes. Condition of engine details good to fair; boilers old and unreliable; new boilers are under construction.

*Minnesota* (old-type frigate).—Receiving ship for boys at New York. Main engines in fair condition; boilers and pumps in use for heating ship, etc., good.

*Mohican* (third-rate cruiser).—In commission on the North Pacific. Condition good to fair.

*Monadnock* (double-turret monitor).—In process of construction at the Mare Island navy-yard; engines and boilers are well advanced.

*Monocacy* (third-rate paddle-wheel steamer).—In commission on the Asiatic station. Important details in good condition.

*Montauk* (single-turret monitor).—In ordinary at League Island navy-yard. Condition good to fair; time required to fit for sea, one week.

*Nahant* (single-turret monitor).—In ordinary at the League Island navy-yard. Important details in good condition, except boilers need repairs; time required to fit for sea, two weeks.

*Nantucket* (single-turret monitor).—In ordinary at the New York navy-yard. Machinery has been put in condition for temporary service.

*Narkeeta* (tug).—In service at the New York navy-yard. Machinery new and in good condition.

*Nellie* (tug).—At Mare Island navy-yard. Machinery in good condition.

*Newark* (second-rate cruiser).—In commission on special service. Condition of machinery and boilers good.

*New Hampshire* (old-type frigate).—Receiving ship at New London, Conn. The heating apparatus is supposed to be in fair condition.

*Nina* (tug).—At the New York navy-yard. Machinery requires overhauling, and new boiler should be fitted.

*Nipsic* (third-rate cruiser).—In use as a receiving ship at Sidney, Washington. Condition of engine fair; boilers require repairs.

*Omaha* (second-rate cruiser).—At the navy-yard Mare Island. Machinery requires extensive repairs; the vessel will probably be sold.

*Palos* (fourth-rate gunboat).—In commission on the Asiatic station. Engine requires extensive repairs; boilers are almost worn out.

*Passaic* (single-turret monitor).—Condition of machinery fair; engines and boilers have been overhauled at the Norfolk navy-yard.

*Pensacola* (second-rate cruiser).—In ordinary at the Mare Island navy-yard. Condition of important details fair.

*Petrel* (fourth-rate cruiser).—In commission on the Asiatic station. Condition of important details good to fair.

*Philadelphia* (second-rate cruiser).—In commission on the North Atlantic station. Important details in good condition.

*Phlox* (fourth-rate paddle-wheel steamer).—In service at the Naval Academy, Annapolis, Md. Condition of engine fair, but requires overhauling; boiler is old and should be replaced.

*Pinta* (fourth-rate vessel).—In commission on the North Pacific. Condition of machinery good to fair.

*Portsmouth* (sailing vessel).—Apprentice training ship. Heating and distilling plant supposed to be in fair condition.

*Puritan* (double-turret monitor).—In ordinary at the New York Navy-yard. Condition of important details good; time required to fit machinery for sea, thirty days.

*Ranger* (third-rate cruiser).—In commission on the North Pacific. Condition of important details good.

*Richmond* (second-rate cruiser).—Attached to the training station at Newport, R. I. Engine details in fair condition; boilers old and much worn.

*Rocket* (tug).—At Boston navy-yard. Condition of machinery fair.

*San Francisco* (second-rate cruiser).—In commission on the Pacific station. Condition of machinery and boilers good.

*Standish* (tug).—In use at the Naval Academy for practice in gunnery, handling machinery, and for other purposes. Engine details fair; boilers require extensive repairs to fit them for effective service.

*Scutara* (third-rate cruiser).—At the navy-yard, Mare Island. Extensive repairs are required; ship will probably be sold.

*Tallapoosa* (third-rate paddle-wheel steamer).—Sold January, 1892.

*Terror* (double-turret monitor).—In ordinary at the navy-yard, New York. Important details in good condition; time required to fit for sea, one hundred and fifty days.

*Thetis* (third-rate vessel).—In commission on the Pacific coast. Condition of machinery good to fair.

*Triton* (tug).—In use at the Washington navy-yard as tug and for general purposes. Condition of machinery good.

*Vermont* (sailing vessel).—Receiving ship at the New York navy-yard. The apparatus for heating the ship and some of the buildings at the station, and for running the steam-ferry scow, is in fair condition; machinery of steam launches and boiler for electric plant in good condition.

*Vesuvius* (dynamite-gun vessel).—In commission on the Atlantic coast. Condition of important details good.

*Wabash* (old-type frigate).—Receiving ship at Boston navy-yard. Condition of auxiliary boilers and pumps good; main engines and boilers have been condemned as unfit for use.

*Wahnetta* (tug).—In service at Norfolk navy-yard. Condition of machinery new and good.

*Wyandotte* (single-turret monitor).—In ordinary at the navy-yard, Norfolk. Condition of important details good to fair.

*Wyoming* (third-rate cruiser).—Sold May 9, 1892.

*Yantic* (fourth-rate cruiser).—In commission on the South Atlantic station. Condition of machinery good to fair.

*Yorktown* (third-rate cruiser).—In commission on the North Pacific. Condition of all machinery very good.

#### NAVY YARDS.

During the past year the construction of machinery for the *Cincinnati* and *Raleigh* (cruisers Nos. 7 and 8) has been continued at the New York navy-yard and is now almost completed. The machinery for the *Raleigh* has been shipped to the Norfolk navy-yard, as ordered by the Department, and is now being erected on board the vessel as rapidly as circumstances will permit; the work of placing the machinery of the *Cincinnati* on board is also in progress at the New York yard. Recently this machinery has suffered some damage from fire, which matter will be referred to more fully later on in this report. At the navy-yard, Mare Island, Cal., the work of building new engines and boilers for the *Monadnock* has been continued. With the exception of the above, the work at the various navy-yards has been in the construction of machinery for small boats; in repairs or preservation of machinery of naval vessels; in preparing stores and outfits for them; in preparing foundations for and installing new power tools; in constructing new boilers and doing other work for other bureaus, as noted elsewhere, and in the care and preservation of the plant and machinery.

In my last annual report attention was called to the great defect in all the navy-yards in the absence of appliances for lifting and transporting heavy weights; the same serious defect still exists at all the yards with the exception of New York, at which yard three overhead travelling cranes and one locomotive crane have been installed during the year. The floating derrick at this yard is also an invaluable tool for handling heavy weights on the water front, its great usefulness being well shown by the frequent calls for it made by other bureaus.

This want of appliances for handling heavy weights is made the more serious by the location of many of the shops, which were erected in the most out-of-the-way places and as far from the water front as possible. The railroad tracks in most of the yards are seldom in condition to allow the transportation of a marine boiler on them, and consequently, when new boilers are built for a ship in a navy-yard, the cost of "skidding" them from the shop to the dock, where they can be reached by the derrick, is no inconsiderable item of expense.

Much time is also lost in obtaining material for small job orders. First a requisition has to be made and sent to the general storekeeper; then the material has to be weighed or measured out and sent to the shop; then if any material is left over it should be returned to the storehouse. A much simpler and better way would be to have a storeroom attached to the machine shop and small quantities of the articles in most common use kept on hand there; then when an order for work is given, the material for it could be obtained from this storeroom and charged against the order, and a return of such charges could be made to the storekeeper weekly. This would cost no more than the present method and would be of great convenience; it would also save not only the time of the men kept running back and forth between the shop and the storehouse, but often of the men on a small job order as well.

Attention is again called to the insufficient office force allowed nearly all the navy-yards. As a consequence, owing to the complicated system of accounts and returns, nearly all the clerical work is behind.

PORTSMOUTH, N. H., NAVY-YARD.

Work in the preservation or repair of machinery has been performed on the following-named vessels: *Enterprise, Fern, Kearsarge, Leyden*, and on the boilers of the late *Galena*.

The work of building steam-cutter engines for general service and making spare parts for same has gone on during the year. Machinery for the new ferry launch for the use of the yard has been completed, erected on board, and the launch is now in service. Castings and forgings of parts of this engine were made for the Naval Academy to be used as instruction exercises for cadets in machining them.

The following work has been done for other bureaus:

*Equipment*.—Inspected boilers.

*Construction and Repair*.—Built six new shop boilers; inspected and repaired shop boilers.

*Yards and Docks*.—Made castings for gas retorts; inspected boilers; made pipe repairs on building No. 10.

*Medicine and Surgery*.—Repaired steam pipes in hospital.

*Supplies and Accounts*.—Handled freight.

The expenditures during the year, other than for the machinery of naval vessels, were as follows:

Civil establishment .....	\$1,800.00
Superintendence and care and repair of shop machinery and tools.....	15,529.09
Improvement of plant with new tools, etc .....	301.50
Care and repair of yard steam launches .....	114.81
Boilers and machinery for launches for general use .....	13,685.92
Labor and material for other departments .....	6,815.70
Breaking up old material .....	900.59
Miscellaneous.....	1,332.48
<b>Total.....</b>	<b>40,480.09</b>

BOSTON NAVY-YARD.

The machine tools for the equipment of a boiler-making plant, mentioned in my last annual report as having been contracted for, have during the past year been completed, delivered and erected at the navy-yard. As the dry dock has been put in condition for use by the erection of new pumping machinery, and as there is no better time to examine and overhaul the machinery of a vessel than when she is in dock, I earnestly renew my recommendation of last year that this yard be again used as a repair station.

The advantages possessed by this yard as a repairing and building station are unsurpassed. Boston, being the wealthiest and most populous city of New England, and situated on one of the finest harbors on the coast, must have proper defenses, and the defenses of the city will also protect the yard. Being one of the principal seaports and manufacturing centers of the country, materials of every description and skilled labor of every kind can be obtained at all times. The skill of the mechanics of this vicinity has won for them a reputation that is world wide, and no better work has ever been done for the navy than at this yard.

Work was done for other bureaus during the year as follows:

*Yards and Docks.*—Repaired boilers.

*Equipment.*—Furnished power for blacksmith shop; repaired boilers; repair work on *Newark*.

*Construction and Repair.*—Furnished power for blacksmith shop; repair work on *Newark*; fitted steam box in boat shop.

Repairs were made to machinery, or stores and outfits furnished, for the following-named vessels: *Concord, Cushing, Fern, Icarus, Narkeeta, Newark, Rocket, Wabash, and Waukena*; also the chartered steamer *Ohio*.

The expenditures during the year, other than for the machinery of naval vessels, were as follows:

Office expenses.....	\$182.76
Care and repair of shop machinery and tools.....	1,345.86
Running, firing, repairing yard engines, and new boilers.....	8,609.15
Improvement of plant with new tools, etc.....	53,165.78
Care and repair of yard steam launches.....	43.86
Holidays.....	346.64
Total.....	63,694.05

#### NEW YORK NAVY-YARD.

During the last year overhauling, preservation or repair work has been done to the machinery of the following-named vessels, or stores and outfits have been prepared for them: *Alarm, Atlanta, Bennington, Boston, Catalpa, Chicago, Concord, Cushing, Enterprise, Fern, Fortune, Icarus, Kearsarge, Miantonomoh, Minnesota, Nantucket, Narkeeta, Newark, Nina, Petrel, Philadelphia, Vermont, Vesuvius, Yantic, and Yorktown*. Alterations were made in the machinery of the *Puritan* and *Terror*, made necessary by changes in the vessels made by other bureaus, and the fire-room of the *Puritan* has been fitted for the use of forced draft. The construction of the machinery and boilers for the new cruiser *Raleigh* is practically completed and the machinery has been shipped to Norfolk to be placed on board the vessel; machinery for the *Cincinnati* is also nearly completed, but its final completion has recently been somewhat delayed by damage sustained when the erecting shop, in which the engines were, was destroyed by fire, as reported upon elsewhere in this report.

It is gratifying to the Bureau to be able to report in regard to the building of the machinery for these two vessels that, judging from the expenditures thus far, its cost when fully completed and erected on board the vessels will be considerably less than the original estimates on which contractors refused to bid, as being too low for the amount of work required, and this, after making due allowance for the cost of repairing the machinery of the *Cincinnati* damaged by the fire. In the matter of boiler material, for instance, quite a large saving in cost to the Government resulted from working this material into shape at the navy-yard instead of accepting the bids that were offered. Attention is called to the Bureau's letter, addressed to the Department February 1, 1890, regarding the matter of flange plates for these boilers. It was therein stated that the only bid for furnishing these plates trimmed to shape and flanged was \$81,200, and that the lowest bid for furnishing the material trimmed to the nearest rectangle or circle was 7.45 cents per pound. The Bureau recommended that the latter bid be accepted, and that the work of trimming and flanging the plates be undertaken

at the New York navy yard. This recommendation was approved by the Department, and the work has now been accomplished with the following satisfactory result:

Total weight of plates purchased.....	pounds..	373,587
Total cost of same, at 7.45 cents per pound .....		\$27,832.23
Cost of labor and material for flanging and trimming plates ready for use.		23,249.29
		<hr/>
Total cost of flange plates completed .....		51,081.52
Only bid received for furnishing same.....		81,200.00
		<hr/>
Difference in favor of navy-yard work.....		30,118.48
Cost of hydraulic flanging machine .....	\$9,200	
Cost of erecting same .....	2,500	
		<hr/>
		11,700.00
		<hr/>
		18,418.48

Or, expressing the above figures in words, the Government has obtained these flange plates ready for assembling in the boilers for \$18,418.48 less than was bid for the same work and has a hydraulic flanging machine to boot.

Satisfactory as the prospect now is for completing this machinery at a less cost than would have resulted from having it built by contract, it is a further satisfaction to be able to state that the New York navy-yard, except for the lack of shoproom which is referred to further on, is now as well prepared as is any private concern in the country to undertake the manufacture of heavy marine engines and boilers. There is no good reason why the Government should not do the greater part of its ship and engine building work, as well as repair work, and it would certainly be good policy to have two or more of the navy-yards completely equipped for the execution of every variety of marine work. In time of war or other emergency the private shipbuilding and engine works would certainly be crowded with work and the Government should surely have some places of its own where construction and repair work could be pushed independent of the uncertain conditions which influence the operation of private industries. On account of its admirable location, League Island should be our great naval station, and New York should be next to it in importance. The transference of much of the building work of the navy from the works of contractors to the navy-yards would be beneficial to mechanics and laboring men rather than otherwise; the same number and classes of men would be employed, and the same amount of money would be distributed to them in either case, with the advantage of certainty of payment at established times when in the employ of the Government.

The experience gained by the construction of the machinery for the two vessels above referred to is an important matter, but the chief thing which has put the Government on an equal footing with civil establishments is the recent act of Congress limiting the hours of labor in the workshops of contractors doing work for the Government to eight hours per day, the same as has been for many years required in the navy-yards. When no longer handicapped by this inequality in the hours of labor, there is no reason why our navy-yards, when properly equipped with tools and workshops, can not do Government work as well, as quickly, and as cheaply as any contractor can.

The power tools and machinery mentioned in my report of last year as having been contracted for, have all been delivered with the exception of the large lathe. During the year the two boilers taken from the *Intrepid* have been put in use for shop boilers, and two others, which





Making stores for issue.....	\$1,537.36
Breaking up old material.....	59.89
Shipments.....	3,725.46
Holidays.....	8,713.22
Miscellaneous.....	109.77
Total.....	140,963.83

## LEAGUE ISLAND NAVY-YARD.

The recommendation that the steam engineering shops at this yard be completed and fully equipped with tools of modern design and of power to handle the heaviest marine-engine work, which I have made in former reports, is earnestly repeated. The naval appropriation bill for the fiscal year 1893, act of July 19, 1892, contains an appropriation of \$25,000 to be expended by this Bureau "for necessary tools and machinery to put the yard in condition to do ordinary repair work," and it is to be hoped that this is but the beginning of the rehabilitation of this splendidly located navy-yard. The following, from the report made in 1883 by the Navy-Yard Commission, recites some of the reasons why this yard is preëminently adapted for the Government's use:

The neighborhood abounds in skilled labor in all that pertains to building modern ships of war, and is in the vicinity of unlimited supplies of coal and iron. A fine fresh-water basin for the preservation of iron vessels laid up "in ordinary" may be secured by dredging out the back channel. Dry docks may be constructed there in number sufficient for the prospective demands of the Navy. The neighborhood of the iron-shipbuilding yards belonging to private parties, and the large machine shops to be found on the Delaware, would enable the Government to avail itself of their services in case of sudden emergency demanding a large amount of extra work.

Nowhere else are so many advantages to be found, and there is no good reason why the Government should not avail itself of them.

The new tools that will be purchased under the appropriation above referred to can be located in a part of the old steam engineering building that is now used as a storehouse; but, before the yard can be regarded as properly equipped for the performance of work which may come to it, some new shops must be built; in general, the scheme for converting this yard into a great ship and engine building establishment, with conveniences for laying up ships not in commission, should be carried out. The new ships now being added to the Navy contain so much large machinery that the capacity of the machine shops in the navy-yards for making repairs is rapidly being outgrown, New York being now the only yard we have where anything more than ordinary repairs can be safely undertaken. For this reason it will soon be necessary to equip at least one other yard for the same purpose, and in view of its many advantages League Island should be one.

When the vessels now building for the Navy are completed it will be found impossible to keep them all in commission because the enlisted force of the Navy is altogether too small to man them, besides which the question of cost of maintenance for such vessels in commission will then be a serious one. It will therefore be found necessary to keep a considerable part of the fleet laid up in ordinary, and these modern steel vessels can not be laid up anywhere under the care of a watchman, as was the case with the old wooden ships. They must be kept in fresh water and convenient to machine shops where their many costly engines can be constantly overhauled and kept in repair. Not only must the main machinery have daily care and attention, but the numerous auxiliaries also must be moved at least a portion of a revolution

daily to prevent them from rusting fast, not to speak of the rapid deterioration of boilers and standing portions of machinery that would be destroyed much more rapidly by rust than by wear in actual use. League Island has already the fresh water and should be supplied with docks or basins and with the necessary machine shops.

During the year work in the preservation or repair of machinery has been performed on the following vessels: *Jason*, *Montauk*, *Nahant*, steam launch No. 105, and steam launch No. 128.

The expenditures during the year, other than those for work done on naval vessels, were as follows:

Civil establishment .....	\$1,200.00
Care and repair of shop machinery and tools .....	8,966.31
Total .....	10,166.31

## WASHINGTON NAVY-YARD.

Work in the preservation or repair of machinery and preparing stores and outfits was performed on the following named vessels: *Cushing*, *Dale*, *Dispatch*, *Dolphin*, *Triton*, and *Vesuvius*.

The expenditures during the year, other than for work on machinery of naval vessels, were as follows:

Office expenses .....	\$4.60
Laborer, inspection board for stores .....	610.00
Care and repair of shop machinery and tools .....	2,019.72
Care and repair of yard steam launches .....	269.46
Holidays .....	104.52
Blue-print apparatus for Bureau .....	936.32
Total .....	3,944.62

## NORFOLK NAVY-YARD.

Work in the preservation and repair of machinery has been performed during the year on the following-named vessels: *Amphitrite*, *Atlanta*, *Bennington*, *Boston*, *Chicago*, *Cushing*, *Dolphin*, *Fern*, *Franklin*, *Janestown*, *Mayflower*, *Newark*, *Passaic*, *Raleigh*, *Standish*, *Texas*, *Vesuvius*, *Yantic*, *Yorktown*, *Wahneta*, *Wyandotte*, and the monitors in James River.

A number of engines and boilers for steam launches for general service have been built during the year. A boiler has been built for the Bureau of Medicine and Surgery for use in the naval hospital at Norfolk.

As has been stated in numerous former reports, Norfolk, from the mildness of its climate, accessibility by land and water at all seasons, ease with which materials of construction can be procured, and the constantly increasing amount of skilled labor in its vicinity that can be made available in case of need, possesses great advantages as a naval station. The yard already possesses a shipbuilding plant capable of turning out iron and steel vessels of any size, but the shops and tools under the cognizance of this Bureau are not well adapted for the construction of modern marine engines and boilers, though most repair work can be done, being specially deficient in modern boiler-making tools and facilities for moving heavy weights. To place the yard in proper condition for this work will require the erection of an erecting shop into which the heavier tools, together with some new ones, can be placed and an overhead traveling crane fitted. A com-

plete set of powerful modern boiler-making tools and overhead traveling cranes in the boiler shop should also be supplied.

To carry out the above will require an appropriation of at least \$49,795.

The expenditures during the year, other than those for work done on machinery of naval vessels, were as follows:

Civil establishment .....	\$1,299.95
Drafting .....	1,735.55
Office expenses .....	2,292.18
Care and handling of stores .....	2,691.43
Superintendence .....	5,334.02
Care and repair of shop machinery and tools .....	22,681.71
Running, firing, repairing yard engines and boilers .....	4,878.08
Improvement of plant with new tools .....	183.28
Care and repair of yard steam launches .....	9,552.56
Boilers and machinery for launches for general issue .....	12,752.56
Labor and material for other departments .....	4,169.38
Experimental and test purposes .....	428.27
Breaking up old material .....	167.76
Shipments .....	90.44
Holidays .....	1,217.68
Miscellaneous .....	33.92
<b>Total .....</b>	<b>69,508.77</b>

#### MARE ISLAND NAVY-YARD.

During the last year the new boilers for the *Ranger* were completed and placed on board, and the work of overhauling the machinery of this vessel and putting it in order for sea service was completed. The machinery of the *Adams* was generally overhauled and repaired and that vessel is now in commission. The machinery of the *Baltimore* was overhauled and repaired after her extensive cruising in southern waters, the most important item of repairs being the retubing of the main and auxiliary condensers. The *Nipsic's* machinery was put in condition to enable that vessel to use steam going from Mare Island to the new naval station at Port Orchard.

Besides the above work, minor repairs, overhauling machinery, preparing stores and outfits, etc., was performed on the following vessels: *Adams*, *Baltimore*, *Boston*, *Camanche*, *Charleston*, *Mohican*, *Monadnock*, *Nipsic*, *Pensacola*, *Ranger*, *San Francisco*, *Thetis*, *Yorktown*, and the tugs *Ivy* and *Nellie*. Repair work was also done to the machinery of the Coast Survey steamers *Hassler* and *Patterson*, the U. S. Fish Commission steamer *Albatross*, and the French cruiser *Champlain*.

The work of constructing new machinery for the *Monadnock* has been continued during the year; some work was done on machinery for steam cutters for general service; foundations were prepared for new power tools, the contracts for which were referred to in my last annual report, and most of the tools have been delivered at Mare Island.

The following work was done for other Bureaus:

**Construction and Repair.**—Repairs to stone dock boiler; made hawse pipe castings for *Ranger* and *Adams*, and castings for various other purposes.

**Yards and Docks.**—Repairs to boilers; made new cylinder and other repairs for shop engines; tested electric-light engine.

**Equipment.**—Repaired electric-light engines of *Charleston*, *San Francisco*, *Baltimore*, *Boston*, and *Yorktown*; made deep-sea sinkers for *Albatross*; made sounding apparatus for *Thetis*; made depth recorders for *Mohican* and *Adams*; made repairs to *Boston's* galley.

**Ordnance.**—Made repairs to Hotchkiss R. F. guns of *Charleston* and for 6-inch B. L. R. of *San Francisco*; repairs to mounts of 6-inch and 8-inch B. L. R. of *Boston*; minor repairs to other guns and mounts.

**Medicine and Surgery.**—Repaired hospital boiler.

The expenditures during the year, other than for work on the machinery of naval vessels, were as follows:

Civil establishment .....	\$1,400.00
Drafting .....	2,706.80
Office expenses .....	2,630.67
Care and handling of stores .....	2,986.18
Superintendence .....	10,821.58
Care and repair of shop machinery and tools .....	25,384.25
Running, firing, repairing yard engines and boilers .....	9,522.15
Improvement of plant with new tools, etc. ....	34,159.28
Care and repair of steam launches .....	913.95
Boilers and machinery for new steam launches .....	317.84
Labor and material for other departments .....	1,138.41
Experimental and test purposes .....	517.55
Making stores for issue .....	7,530.21
Breaking up old material .....	351.12
Holidays .....	2,781.83
Miscellaneous .....	2,762.18
<b>Total .....</b>	<b>105,924.00</b>

## PENSACOLA NAVY-YARD.

No work has been done at this yard during the year except for the care and maintenance of the plant.

The expenditures were as follows:

Civil establishment .....	\$1,000.00
Office expenses .....	75.22
Care and handling of stores .....	531.92
Superintendence .....	1,232.00
Care and repair of shop machinery and tools .....	813.77
Running, firing, repairing yard engines and boilers .....	108.24
Care and repair of yard steam launches .....	766.12
Miscellaneous .....	71.27
<b>Total .....</b>	<b>4,598.54</b>

## NAVAL TRAINING STATION, NEWPORT, R. I.

The work done at this station during the year has been that necessary for the proper care and maintenance of the plant. Stores and outfit were prepared and furnished the *Richmond*.

The expenditures during the year, other than for the stores of the *Richmond*, were as follows:

Care and repair of shop machinery and tools .....	\$302.55
Care and repair of yard steam launches .....	1,983.14
Miscellaneous .....	620.70
<b>Total .....</b>	<b>2,906.39</b>

## NAVAL STATION, NEW LONDON, CONN.

Steam heating apparatus has been fitted on board the *New Hampshire*. With this exception no work has been done at the station during the year except that necessary for the care of material and stores.

The expenditures, other than that for the *New Hampshire*, were as follows:

Superintendence and care and repair of shop machinery and tools .....	\$876.11
Care and repair of yard steam launches .....	1. <sup>7</sup>
<b>Total .....</b>	<b>—</b>

## NAVAL STATION, KEY WEST, FLA.

No work has been done at this station except that necessary for the care and preservation of stores and machinery.

The expenditures were as follows:

Superintendence, care, and repair of shop, machinery, and tools; running, firing, and repairing yard engines and boilers .....	\$1,576.50
Total .....	1,576.50

## NAVAL ACADEMY.

Necessary repairs have been made to the machinery of naval vessels and steam launches attached to the Academy.

The expenditures, other than for naval vessels, were as follows:

Putting up shelving, etc .....	\$591.30
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## PERSONNEL.

*The Engineer Corps.*—Since the date of my last annual report, twelve officers—six chief engineers, four passed assistant engineers, and two assistant engineers—have been removed from the active list of the corps by death, resignation, or retirement. Under the operation of existing law these casualties created only three vacancies at the foot of the list of assistant engineers, which vacancies were filled the 30th of June last by the appointment of three young gentlemen just graduated from the Naval Academy, and who are now undergoing a course of instruction at the New York navy-yard to fit them for the duties of naval engineers. The corps has now, therefore, a membership of nine less than it had a year ago, although at that time it was reported as being insufficient for the performance of the duties required of it; nor is this the worst feature of the case, for the present membership of one hundred and eighty-three is thirteen in excess of the number allowed by the act of Congress of August 5, 1882, and consequently the reduction provided for by that act is still in operation, further crippling the corps, retarding promotion and driving efficient young officers out of the service. In this connection I would call your attention to the fact that since the passage of the act above referred to no less than *thirty-nine* young officers, every one of whom had been educated at the Naval Academy at great expense to the Government, have resigned from the Engineer Corps.

The actual state of affairs in the Navy now as regards its engineering branch is very serious and very alarming; the use of high-powered machinery and the adoption of small machinery for all sorts of purposes on board ship have so increased and complicated the scope of the engineers' duties that the present number available for sea duty, even after the shore stations have been reduced far below the number actually needed, is so utterly inadequate for the duties to be performed that it has now become simply a matter of cruelty to place officers on sea duty, where their hours of incessant and laborious toil, performed under great mental strain and the weight of responsibility, are greater and more exhausting than those of the laborer on the streets or in the building trades. Not only this, but on account of paucity of numbers, the engineer at sea now frequently finds himself ordered to the performance of duty so multifarious as to be beyond the limit of his physical capacity and endurance, thus forcing him to jeopardize his commission

and his professional reputation for the nonperformance of duties for which he is held responsible.

The machinery of our modern ships is so expensive and, of necessity, so complicated that it is simply visionary to discuss any scheme tending toward making machinists responsible for it, or even for active supervision of the watches at sea, except perhaps on small ships on special service in home ports. The number of men now employed in the engine and boiler rooms of all but the smaller ships has become so great that the person in charge of a watch or of the work of the day must have an unquestioned official status, administrative ability, and thorough professional knowledge as well. The machinist has at best nothing but an irksome position at stake, and it is folly to expect of him anything more than the perfunctory performance of such work as is immediately at his hand. Existing conditions are such that we get very few thoroughly efficient machinists for the work now required of them, and as it is absolutely necessary that the engineer officers receive more efficient aid from this class of men than is accorded now, something must be done to improve their status, and that soon. I propose to enter into this subject at length, later on in this report.

To provide for the proper supervision and care of the immense amount of steam machinery we have now building or already afloat, provision must be made by Congress for a sufficient increase in the membership of the Engineer Corps to admit of the detailing of enough officers to all ships to stand proper watches in the engine department, and at the same time not neglect the very important shore duties. Objection has been made to the detailing of this sufficient number of engineers to cruising ships on the ground that there is not room for them on the ships. I hold that quarters should be provided for the people who are indispensable in the maintenance of the ship, and that it would be better to make reductions elsewhere than to allow a million dollars worth of machinery and the work of 100 or 150 men to go uncared for, even though the cry be raised that the ship has too many engineers when a sufficient number is detailed for necessary duty.

For any cruising vessel of 5,000 horse power and upwards there should not be less than one chief engineer and four assistants, while in some of the new vessels of great power there should be a sufficient number of assistants to have two officers on duty at a time. In vessels of small power not engaged in general cruising, one engineer officer in charge with one or two assistants, or with a picked crew of machinists as circumstances would determine, would be sufficient. In no case should a vessel, however small, engaged in long-distance cruising be sent to sea with only one engineer officer.

A considerable number of engineer officers have now to be employed on inspection duty with machinery building by contract for new vessels, such inspection being obligatory by the terms of the contracts, and the increased amount of building and repair work incident to the increase of the fleet has made it necessary to detail additional engineers at some of the navy-yards. Neither the navy-yards nor the inspection details have enough officers for the thorough performance of the duties required, but the demand from these two sources has so reduced the number available for sea duty that with very few exceptions our cruising ships are now at sea with such inadequate numbers of engineers as to really jeopardize the safety of the machinery and that of the ships with it.

On our most powerful ships—those of 10,000 horse

power—the usual complement now is one chief engineer and three assistants, the latter being obliged to stand watch in three watches at sea and often in port; a duty so exhausting that no officer can long perform it efficiently, for he never has a whole night's rest, and when on duty has to withstand a constant, merciless assault upon his physical and mental powers. His post of duty is one of intense heat and villainous atmosphere; to get from one part of his station to another, which he must do very frequently, he must climb up and down narrow ladders, crawl through air locks, explore coal bunkers, etc., all the time in a state of mental anxiety on account of the innumerable casualties, great and small, that are constantly occurring, and for the prompt remedying of which he is strictly accountable; in one water-tight compartment some boiler tubes are leaking and the men are in a panic; in another, a hundred feet or more away, a feed pump is refusing to work or a thrust bearing is hot, and while hurrying from one scene of danger to another the engineer is liable to receive tidings of trouble in some remote coal pocket, or even be summoned to appear on deck, where he must calmly answer questions regarding the amount of smoke escaping from the smoke pipes or the necessity for hoisting ashes, wholly unmindful of the disasters which he knows are impending below. So it goes, watch after watch and day after day, until in the course of a week or two the engineer is a nervous wreck, fit for nothing but the hospital; and all because the lack of numbers imposes upon him the work of at least two men.

In ships of 3,000 or 4,000 horse power, like the *Bennington* or *Boston*, for example, the chief engineer has but two assistants, who are assigned to what is termed "supervisory watch" at sea; in theory the officer on duty need not remain constantly at his post, but in practice he can not sit complacently in his quarters and allow his responsibilities to take care of themselves, so that really the duty imposed upon the two officers amounts to standing watch and watch, six hours on duty and six hours off, or twelve hours daily, day and night for days and even weeks at a time. Such a condition reduces those who have to bear it to the mere animal existence of a beast of burden, and I wonder at the constancy of intelligent men in enduring it with nothing to sustain them beyond the hope that a change for the better can not be far off. In the case of the smaller ships, some of which, however, are of 2,000 horse power and upwards, it is necessary to send them to sea with but one engineer officer. If the vessel is on some special service, doing very little cruising, like the *Vesuvius* for example, one engineer, aided by a corps of competent machinists would be sufficient, but I maintain that any war vessel large enough to take the sea and go on a foreign cruise should carry at least one assistant for the chief engineer. The case of the *Ranger* which came before the Department the past summer is an excellent illustration of this necessity, and also shows a result of the present scarcity of engineer officers at navy-yards.

The *Ranger*, after being in continuous service for more than ten years, was put out of commission at the Mare Island navy-yard in August, 1891, and orders were given to overhaul and repair her machinery for further service. This work was carried on as rapidly as possible and the vessel was put in commission again in April, 1892, sailing from San Francisco the 11th of May for her post of duty in Bering Sea. After touching at Seattle and Port Townsend she sailed from the latter place May 21, but returned there the 27th disabled, the telegraphic

report of her condition made by her commander to the Department being as follows:

*Ranger*, Port Townsend.—Condition of shaft and couplings such can not use sail and steam together. Necessary to examine shaft for alignment; also high-pressure stuffing box, and repair as found necessary. Engineer Bayley disabled by a fall; must go to hospital. Another engineer required. Probable time about works five to ten days, as developed by further examination. Details mailed.

The immediate result was that the *Ranger* was supplied with another engineer officer and was detained for repairs, performed by workmen from shore at Seattle, until June 19, when she sailed for Sitka. The actual time lost by the vessel from the date of her first sailing from Port Townsend until she sailed again in sea-going condition was twenty-nine days, and her services were accordingly lost for that period to the fleet protecting the seal fisheries in Bering Sea.

It appears that the first day after sailing on her important mission, the only engineer officer on board was disabled by an accident which confined him to his bed, leaving the engine department to get on the best it could without a head; matters progressed from bad to worse, as is shown by the detailed reports of the commanding officer and the court of inquiry, until the final collapse came. The whole miserable affair from beginning to end is directly chargeable to the insufficiency of numbers in the Engineer Corps, which allowed but one engineer officer to be detailed for this vessel, ordered to important duty on a distant station, where there are no facilities for making repairs, and which did not permit the chief engineer of the yard where the vessel was fitted out to have the proper number of assistants to aid him; in fact, for some of the time he had no assistant at all.

It is not possible to make the watch duties of engineers on board ship less severe by requiring the chief engineer to stand a watch, since he is already taxed with cares and responsibilities up to the limit of human endurance. He is always on duty, night and day, and must at any moment be fully informed of the exact condition of every detail of his department. He must be climbing up and down ladders in and out of his department almost constantly, adding physical exhaustion to mental worry and strain. It is perfectly true to say that if the chief engineer of a modern war vessel performs his duties thoroughly and conscientiously there is no more wearing, trying, and exhausting position to be met with on the sea. In this connection I would say that the chief engineers now on the active list of the Navy are almost without exception men past 50 years of age, and in the regular order of things very few men will be promoted into that grade for many years to come who are not at least 50. Many of these officers are physically unfit to perform efficiently the duties of chief engineer on a modern cruiser or battle ship; duties which by their nature can only be properly executed by a man who is physically athletic and vigorous. For this reason, and in order that we may in the future have younger men among the chief engineers for the performance of the more arduous sea duties, I most earnestly recommend that the Department ask Congress for legislation extending to the Navy, or at least to its engineer corps, laws now existing which provide for voluntary retirement after thirty years' service of officers of the Army and Marine Corps. The law referred to should be modified to the extent of making such retirement possible, in necessary cases, whether the officer concerned applies for it or not. I think also that the age for compulsory retirement of engineer officers, now fixed by law at 62, should be reduced to not more



than 55, as the usefulness of a sea-going engineer is in the majority of cases gone at that age. In the British navy inspectors of machinery retire at the age of 60 and have the option of retiring at 55 while fleet, staff, and chief engineers retire at the age of 55, with option of retiring at 50. Fleet, staff, and chief engineers may also retire on full pay after thirty years of meritorious service. The adoption of similar practice by us I believe would be of great benefit to the service.

Besides making it necessary for our cruisers to go to sea with a dangerously small number of engineer officers, the present reduced condition of the corps has caused the abandonment of other work of great value to the service and the country at large. Since the act of Congress of the 26th February, 1879, which permitted the detail of engineer officers as instructors in technical schools and colleges, officers have been so detailed in many parts of the country and have rendered most valuable service to the cause of technical education, as proved by innumerable letters from prominent officials of the Government and of colleges, commending their work, and the strenuous efforts made to secure renewal of their details. In consequence of reduced numbers of the corps, it has become necessary to withdraw these details in order that the imperative demands of strictly naval duty might be met. The result has been that a number of schools have been unable to start or maintain a mechanical course, and others have had the efficiency of their courses seriously impaired.

Much as Congress has done for the technical education of the youth of the country, I doubt if any one thing has been of more benefit than the passage of the act above referred to, and I doubt further if it can, at this time, do anything that will be productive of better results in this respect than to so increase the Engineer Corps that these details can be continued, more especially at the colleges that have lately been established in the coal and iron districts of the Southern States; colleges where the instruction is to be more technical than classical, and which are to be important factors in the development of that section of the country, but which are still too young to have grown so rich by legacies and endowments that they can afford to be indifferent to or independent of this little aid from the Government.

That the Engineer Corps is now altogether too small for anything more than a heroic effort at performing its duties is a fact that is recognized by all who are familiar with the conditions of the Navy and not antagonistic to its actual needs. In my annual reports for the past few years I have entered quite fully into the subject of increasing the Corps and the method of education and appointment of junior officers to make certain that men who are capable and efficient will be obtained. It has been highly gratifying to find my views heartily supported by the Department in its annual reports for the past two years, and relying upon the wisdom and forethought of the present naval administration, I feel sure that this urgent matter will be laid before Congress persistently until action is taken. The membership of the corps should be increased to not less than 300, and as any increase must necessarily be gradual, provision for it can not be made any too soon. The bill providing for this necessary increase, which failed in the Fifty-first Congress and is now pending in the Fifty-second, would by its provisions require about eight years after its passage to complete the increase, during which period all the vessels now building will be added to the fleet and the Engineer Corps will be utterly helpless, so far as caring for these vessels is concerned, without some accession of mem-

bership. For these reasons it is highly important that the support previously accorded to the measure by the Department be renewed by earnest recommendations to Congress on the subject.

The only opposition to this bill thus far has come from some of the officers of the Navy who seem to view with jealous distrust the growing importance of the engineering branch of the service and see in it an imaginary menace to the supremacy of the positions which they have inherited from naval conditions now obsolete. The plain fact is that the era of the sailing frigate with lofty spars and snowy canvas has forever passed away, and with the passing of the frigate must occur also the disappearance of much of the picturesque personnel which served its purpose in its own time, but which is now out of place on the sea except in its romances. Naval gentlemen who resent the intrusion of the steam engine and its attendants are doubtless sincere in their convictions, and really believe that the *Constitution* is the proper type of fighting ship and that the *New York* is not, but they draw upon the traditions of the past for their propositions and overlook the living facts of the present. The stage driver did not yield his place to the locomotive driver until a vast amount of prejudice and conservatism had been overcome by the logic of facts, and our navy will be neither modern nor efficient until it has accepted similar relegations. The sail-maker must make way for the machinist and the boatswain for the blacksmith. The topman on a yard-arm, struggling with a weather earing in a gale of wind, is a figure that has been almost deified in the literature of the sea, but the service he rendered to his ship and his country never exceeded in importance the unsung deeds wrought daily in these times by the mechanic with hammer and chisel in the depths of an engine or boiler room.

In regard to the provision of the bill which confers upon the engineer officers the rank of their grades instead of the honorary relative rank now held by them, I wish to say that the conferring of this rank would be simply an act of justice in recognizing the services of a class of officers who have to do the greater part of the work of maintaining the efficiency of our modern war vessels. This feature has been opposed by some officers who claim that it threatens their right to absolute command. Whether or not it is good policy to intrust the full control of sailless ships, every function of which is performed by a machine, to officers who by education and training are ignorant of the operation, care, and management of machinery, is a question that is worthy of very serious consideration, but it is one that is not raised by any provision of the bill which these officers oppose. On the contrary, the bill provides that the right of the engineer to exercise command shall be confined to his own department, where he does most unquestionably need that right. The wording of this provision of the bill was taken from laws that have existed for forty-five years regarding the status of staff officers of the U. S. Army, and therefore should not be regarded as anything unusual or speculative, especially as the possession of rank, without command except in their own departments, has made the staff of the Army a contented and efficient body of officers and has effectually put an end to the petty line and staff differences which still distress the Navy.

The Army, large as it is compared with the Navy, seems to be well and harmoniously governed internally with nothing in the whole book of regulations restricting the military status of staff officers except the two following paragraphs:

Officers of Engineers or Ordnance, or of the Adjutant General's, Inspector-General's, Judge-Advocate General's, Quartermaster's and Subsistence Departments, though eligible to command according to their rank, shall not assume the command of troops, unless put on duty under orders which specially so direct, by authority of the President. (Sec. 16, Art. IV, U. S. Army Regulations, 1889.)

An officer of the Pay or Medical Department can not exercise command, except in his own department; but by virtue of his commission, he may command all enlisted men like other commissioned officers. (Sec. 18, Art. IV, U. S. Army Regulations, 1889.)

Surely regulations as simple and direct as the above are far preferable to the great mass of regulations and circular orders now relating to the same subject in the Navy.

It has been claimed that the possession of rank and the right to exercise command in their own department is merely a matter of sentiment on the part of the engineer officers. When officers find themselves charged with the maintenance of all the vital parts of a huge and costly war ship, and when the exercise of their prescribed duties involves the direction and superintendence of the labors of one-third or one-half of the ship's crew, they very naturally expect to be clothed with the legal right to perform their duties, a right that is now denied by section 1488 of the Revised Statutes of the United States. There is not much sentiment in this, but merely an effort on the part of a class of officials who have to perform military duties involving command and obedience, to have their exercise of authority made lawful. Such sentiment as there is in the matter exists in the minds of the junior members of the corps who have been specially trained from youth for the positions of naval officers, and as ninety-six of the present membership of one hundred and eighty-three in the corps are graduates of the Naval Academy, their views should receive some consideration and their feelings should be respected.

The practice of assigning graduates of the Naval Academy to the different branches of the service is now, and has been for ten years, practically the same as is in vogue at West Point, the vacancies in the different corps being filled by an assignment of the cadets made by the Academic Board, the wishes of the cadets being observed so far as is practicable. It is so nearly impossible that the number of vacancies existing in each corps should agree with the number of cadets volunteering for any particular corps that each year we see cadets given commissions in arms of the service for which they have no liking and perhaps no aptitude. Those who are commissioned in the line and Marine Corps are immediately clothed with the rank and title of their grades and receive the honor and dignity of position to which such official status entitles them. Those who find themselves in the Engineer Corps, perhaps against their own wishes in the matter, are confined to mere relative rank, which is regarded in the service as no rank at all, are occasionally taunted in the public newspapers by their classmates with being "civil officers," "non-combatants," etc.; are discriminated against on board ship in the matter of quarters, and in other ways are occasionally humiliated and made to believe that they have been accorded a status inferior to that of their classmates. All graduates of the Military Academy are commissioned with the rank and title of their grades and are regarded as actual army officers, irrespective of the branch of the service to which they are assigned; but if it should be directed that those who enter one of the most important branches of the service, the artillery for instance, were to be denied a military status and confined to relative rank, then West Point would have a system of discrimina-

tion exactly like the one practiced at Annapolis regarding the Engineer Corps, and the injustice of which would be obvious without any argument.

Before concluding my remarks on this subject of rank for the Engineer Corps, I wish to call your attention to the comments regarding it made by the Senate Committee on Naval Affairs, Fifty-second Congress, in its report No. 576, dated April 20, 1892, reporting favorably and recommending the passage of the bill to increase the efficiency of the Engineer Corps. As this bill was before the committee for several months, and as a similar bill was under consideration by the same committee during the sessions of the Fifty-first Congress, the opinion expressed regarding the propriety of conferring rank upon the officers of the Engineer Corps can not be regarded as a hasty one, but, on the contrary, one arrived at after very careful deliberation. The committee reported as follows:

The establishment of an official status for the officers of the Engineer Corps by assigning rank to them, instead of relative rank, as heretofore, appears to the committee to be a just and necessary measure in view of the great importance of this branch of the service and the responsibilities these officers have to assume on modern war vessels, where steam engineering has practically replaced the old seamanship, and where the chief engineer and his assistants have control over a large part of the entire crew of the vessel, and upon the exercise of whose authority depends the efficiency of the ship as a fighting machine.

The conferring of this rank is in accordance with the laws relating to staff officers in the Army, and does in no way conflict with the right to command now vested by law in the officers of the line. This is provided for by section 4 of the bill, which confines the authority of the engineer officers to their own department.

Any official or person who gives orders or directions controlling the operations of bodies of men must have some right or authority for his action, and in a military organization rank, and rank alone, confers this authority. Without rank there can be no legal responsibility, and there can be no legal authority for giving orders to others, and no legal reason why obedience should be rendered. The rank makes the officer and is his sole warrant for the exercise of his functions. An officer without rank is a contradiction of terms, and any person placed in so anomalous a position must necessarily act in a tentative and inefficient manner, depending upon his personal qualities alone for his influence, and upon the good sense and good will of others in recognizing and deferring to the correctness of his judgment.

The engineer officers of the Navy are now in precisely this anomalous position. From the unimportant auxiliary part which steam engineering had in the Navy of forty years ago, it has slowly advanced, with the development of mechanical inventions, until now it has ceased to be auxiliary, and is the department upon whose efficiency depends entirely the efficiency of the whole ship as a fighting machine. Its officers, however, have not been granted a status commensurate with the continually growing importance of their duties and responsibilities, and, being obliged to exercise their functions without authority of law, are still dependent upon the good will of their subordinates for the execution of orders upon which the usefulness of the whole ship depends.

The responsibilities of the engineer on a modern man-of-war are second to none in importance, excepting those of the commanding officer, and the latter himself would be powerless to inflict injury upon an enemy unless supported by the intelligence, skill, energy, and courage of the engineer, who must coolly perform his duty and control his men in the presence of the enemy and under the most trying conditions of battle, to be shot at without the opportunity of shooting back.

The rank conferred by this bill appears to your committee to be fair and just. In the Army actual rank is given to every department of the staff as well as to field and line officers, even to the Medical Corps and chaplains. Why, then, should this most important branch of the naval service be discriminated against by confining it to mere relative rank?

Your committee can see nothing in the reason or policy of such discrimination. The rank of captain, commander, lieutenant-commander, lieutenant, lieutenant (junior grade), and ensign corresponds with the rank of officers in the staff corps of the Army, and equalizes those in the staff corps of the Navy.

I renew my recommendation of previous years, that legislation be asked for providing an assistant to the Engineer-in-Chief, who shall

an officer of the Engineer Corps. Under existing law the chief clerk becomes acting Chief of Bureau in the absence of the Engineer-in-Chief. The gentleman who now occupies the position is as competent for it as any man in the country, but naturally he has not the technical knowledge necessary for him to decide the professional questions constantly arising, and it is not fair that he should be compelled to accept the responsibility for official action which must be based on the opinions of others. In the Bureau of Medicine and Surgery provision has long existed for a professional assistant, and I consider there is the same necessity in this Bureau.

*Enlisted men of the engineer's force.*—The subject of making provision for training mechanics and firemen for the Navy is one of such vital importance that I have dwelt upon it at length in my annual reports ever since I have had the honor to be at the head of this Bureau. Last year it was stated that the *Miantonomoh* had been proposed as a training ship for men of the engineer's force, and that a course of instruction would be begun as soon as the vessel was placed in commission; but it was found impracticable to carry out the scheme on account of the very limited amount of seagoing performed by the vessel. The *Fern*, as a vessel constantly cruising, was then selected, as well suited for the purpose, and she now carries six men for instruction in addition to the regular complement of her engineer's force, the number being limited by the small size of the vessel.

To maintain a cruising vessel of suitable size for the sole purpose of training firemen and mechanics would involve considerable expense, but on account of the importance of the work I believe it would be good policy to devote one of the new high-powered vessels—the *Maine*, for example—to this use, the vessel to be kept in commission and actually cruising the greater part of the time. Money expended for this purpose would be more than returned in the increased efficiency of the engine and fire-room men, upon whose labors, as a matter of fact, the usefulness of a modern ship very largely depends, and would certainly be as well bestowed as the large sums now expended for the maintenance of a squadron of obsolete sailing ships in which apprentice boys are taught to cross royal yards and reef topsails with great agility, while in the real navy for which they are being trained there are no royal yards or topsails upon which they may display the perfection of their training. Sail and spar drills certainly do inculcate habits of self-reliance and courage, and develop physical activity, but as battles have been won in all ages by men who have not had the advantage of such training, it can hardly be said to be absolutely necessary for fighting efficiency. It seems to me that our men should be taught to do the things that have to be done on board ship rather than things that used to be done in a bygone age.

The use of such a ship as I have recommended for a modern training ship would by no means be confined to training firemen; it would serve excellently as a school for the marines and guns' crews, the men who do the actual fighting, and who should be made familiar in peace with the tools they must handle in war, and above all it would furnish an opportunity for engineer officers and engine-room petty officers to become familiar with the conditions of forced draft, high speeds, and high pressures, conditions very different from any that have existed in our Navy until within a very few years. In view of the very remarkable changes that have come over marine-engine practice within recent years, I consider this matter of the training of the engine-room force one of great importance, and one, moreover, in considering which we are be-

hind some other navies. Bearing directly upon this subject, I quote the following from an essay entitled "Speed as a factor in naval warfare," by Rear-Admiral the Hon. E. R. Freemantle, K. C. B., C. M. G., read before the Royal United Service Institution, February 3, 1888. Admiral Freemantle says:

If I am right as to the strategical combinations which are now possible, it becomes more and more necessary that our engineering staffs should have frequent practice in working the powerful engines at full speeds for runs of 1,000 miles or more. There is little difficulty about it if the British public understand that the coal bill must be increased very decidedly. We have, I rejoice to say, entirely broken away from the foolish craze of the "most economical rate of speed," which acted as a premium on inefficiency, and already we see a marked improvement in the steaming of our ships. Practice and nerve, too, are required to work the giant engines at revolutions of one hundred or more, and practice must be allowed.

I have heard that when the *Esmeralda* was on her trial trip with Chilean stokers the latter clean bolted when the higher speeds were reached; and I am certain that many in our engine-room departments have thought occasionally of doing the same in like circumstances, but familiarity fortunately breeds confidence as well as contempt. I know that I ran out to Gibraltar from Plymouth at an average of nearly 12 knots in the *Dreadnought* in 1884, and if I recollect rightly the *Invincible* did even more. If these by no means fast ships could do this why not a squadron?

I am glad to see that the admiralty are moving in these directions, and if the coal bill can be got over we shall probably move faster. It is sad to think that in these remarks about speed I have had little or nothing to say about sails, but so it is. Let us recognize at once that the old seamanship is only an accomplishment and an interesting relic, and that the chief engineer and the engine-room department have a far greater part in the seamanship of the present than we like to acknowledge.

Coming now to the question of machinists, we must bear in mind in considering it that we must have them, and plenty of them, on our new vessels, and that to be at all efficient they must be intelligent, respectable, and self-respecting men, entirely above the careless, indifferent characteristics supposed to be indispensable in the man-of-war's-man. They must be skilled workmen, taken from the great army of men who are now doing the world's work by executing with their hands the plans of others, and until the Navy can offer them advantages equal to those held out by the great industrial establishments it will be idle for us to expect to get the class of men we need. In civil employment such men can earn about the same pay as is given machinists in the Navy, but the hours of labor are fewer and the work is less severe, while the man is master of his own time when his day's work is done; so the only real advantage which the Navy can offer is the assurance of permanent employment, which is never certain in any civil establishment, however sound its management may seem to be.

There is an impression in some quarters that all a machinist is required to do is to start and stop the engines of a ship when at sea and to watch a gang of men cleaning bright work in port. If this were true, we would not need machinists at all. The fact is, however, that the modern marine engine is a very complicated affair, and needs not only intelligent manipulation when in use, but a high grade of mechanical skill to keep it in proper order. Besides the main engines we have now forty or fifty smaller engines for all sorts of auxiliary purposes on each of the new ships, many of which are necessarily complicated machines in themselves; and the derangement of a little high-speed engine used for running a dynamo or forcing the draft of the fires is often as perplexing and as difficult to remedy as the breakdown of a much larger one. Complicated machines stowed in all sorts of places on a ship do not work as well as machines of the same kind fixed on stone foundations on shore, for which reason constant employment in making repairs to such machines is furnished the mechanics of the engineer's

force from the beginning of a cruise to its end, and the work required is of a character which can not be done by any but experienced machinists.

That we do not get suitable men for this rating now is a fact well known to all naval officers. We do occasionally have some very excellent machinists, but they seldom serve more than one enlistment, if, indeed, they remain that long; so in practice the rating is largely made up of men who, owing to some failing, can not keep a position on shore, and who are consequently unreliable on board ship. I am convinced that these men are not wholly dissatisfied with the pay they receive nor with the work required of them, but that the whole trouble lies in the unfortunate status accorded them in the service. They are herded in with the ship's crew indiscriminately on the berth deck the same as the coal heavers; they are allowed to draw a portion only of their pay after they have earned it, there being a tradition in the Navy that a seafaring man should not be trusted with his own money; they can not go on shore except through the medium of the "liberty list," subject to the same surveillance and restrictions as govern the landsmen, and, above all these discouragements, the machinist has, in common with the other men of his department, to put up with all sorts of petty persecutions from a conservative class in the Navy, not entirely confined to enlisted men, which clings to the traditions of the past and regards the entire engineer's force as a sort of pariah class, whose presence on a man-of-war is an unholy intrusion which must be resented in every possible way. If a machinist or fireman crawls out of the hellhole where he is on duty to get a breath of fresh air, he may be promptly driven below again or even punished for appearing on deck "out of uniform," while the discovery of a speck of dirt anywhere on deck subjects any member of the engineer's force who may have the rashness to be above the fire-room gratings to abuse from the boatswain's mates and probable punishment at the mast. That the decks of a man-of-war should be of spotless purity is a tradition handed down from the days of wooden ships and bare-footed crews, and is so impossible a condition in these days of coal and iron and steel, that it seems a little intelligent consideration would lead to its abandonment.

All these unhappy details are different on different ships, but the general results are the same. The useful and self-respecting man, when he finds himself so unfortunately circumstanced, will in sheer self-defense leave the service forever; another man will accept the situation and become a chronic offender against the Navy Regulations because he finds that he is treated as one anyway. He smuggles rum on board and gets drunk on duty, because it is taken for granted that he will do so unless closely searched and watched; he overstays his leave when on shore, because he quickly sees from the rare occasions that liberty is given him that nothing better is expected; and, in general, he adapts himself to his surroundings by assuming the irresponsible and unreliable characteristics of the unlettered man-of-war's man of a hundred years ago.

There is another thing that is too often overlooked in naval discussions regarding the status of machinists on board ship or of Americans in the Navy in general, and that is the fact that the United States is a free country, founded in the first instance as a refuge for intelligent men from the very conditions of mental and physical servitude which the Navy by clinging to old methods imposes upon our citizens who enter it. We hear only too often in the service arguments based upon the condition of enlisted or conscripted men in the monarchical military organizations of foreign countries, as though we could by any possibil-

ity benefit by such incongruous comparisons. We can and do get foreigners to serve in our Navy and accept conditions exactly like those which they may have abandoned their own countries to avoid, but we will not have an American navy until it is manned by Americans, and that time will not come until we cease attempting to perpetuate on our ships military customs which flourished in feudal times.

After giving this matter much careful consideration I am convinced of the necessity of creating a corps of engine-room petty officers, composed of machinists, blacksmiths, boiler-makers, and coppersmiths, whose numbers will be determined by the actual need for men of these ratings, and not dependent upon the total number of the enlisted force of the Navy. I am prepared to submit at the proper time for the consideration of the Department and the Bureau of Navigation details as to the numbers needed and a scheme for the organization and recruiting of such a corps. Without entering into it fully at this time, I will say that my scheme will recommend provision for permanent service, by making the period of enlistment much longer than at present; by granting privileges on board ship as to quarters, leave to go on shore, immunity from drills having no connection with their duties in either peace or war, etc.; by making employment on shore in fitting out new ships in which the men are to serve possible, and by providing for retirement on a pension after a certain length of continuous faithful service.

Regarding the matter of immunity from drills having no connection with the duties of this class of men, I will say that there is no doubt that any man on board a war vessel is more generally useful if he is proficient in the use of weapons of war *in addition* to his familiarity with his special duties, but if soldierly proficiency on the part of the men of the engineers' force is acquired by the sacrifice of their proficiency in their own direct duties, they become inefficient rather than useful. In battle or emergency, their proper stations are with the engines and boilers, and not on deck with rifles in their hands. In this latter case they would, at the critical moment, be away from familiar duties, of the greatest importance to the safety of the ship, and required to perform others, also of great importance, but of which their knowledge may be very indifferent. Let us first of all train our men thoroughly in the duties that they must perform in action, after which, if time permits, it will be well to extend their knowledge, and consequently their usefulness, by teaching them something else, be it infantry tactics, book-keeping, or surgery.

#### EXPERIMENTAL WORK.

As Congress has steadily refused to grant the small appropriation I have repeatedly requested for conducting experiments, the Bureau has been unable to carry on any which would involve expense except such—like tests of material—as may properly be considered a part of the cost of construction. Under this head are the tests of banded copper pipe (Appendix A). These are published on account of the great interest in all such tests when conducted by Government officials, who have no interest in obtaining special results and whose work is therefore thoroughly reliable.

The experimental board at the New York navy-yard is employed almost constantly in making tests of various patented and proprietary articles, at the expense of the parties interested, for the information of the Department, and information of great value is thereby obtained.



This can not be published on account of the Department's order forbidding the giving out of reports of tests that can be used as advertisements.

I respectfully renew my recommendation of former years that a small sum be appropriated for the use of this Bureau in making experiments. Many promising schemes for improvement or increase of economy present themselves, and in the absence of a fund for experiments the Bureau must either take the risk of putting them in use on a large scale, where failure would involve great loss, or else wait until the merchant marine has proved them. It hardly seems right that the Government should leave such matters to private enterprise:

#### CONTRACT TRIALS OF NEW VESSELS.

For the first time in several years the Bureau has no trials of new vessels to report, although there are now several vessels nearly completed and whose trials will shortly occur.

The three tugs whose machinery was described in my last annual report have been tried, accepted, and are now in service. Owing to the limited amount appropriated for building these tugs, no effort could be made toward elegance of design, the plainest and cheapest construction consistent with strength and thermal economy being necessary.

An account of the trials is given in Appendix C.

#### MACHINERY UNDER CONSTRUCTION FOR NEW VESSELS.

The state of work on the machinery of the vessels reported upon in my last annual report is as follows:

*Maine*.—Hull under construction at the navy-yard, New York; machinery built by N. F. Palmer, jr., & Co., of New York. The machinery has been completed at the works of the contractors, transported to the New York navy-yard, and erected on board the vessel, the boilers, main engines, auxiliaries, etc., being in place and the work practically completed, with the exception of some minor details of connecting piping, fitting floor plates, gratings, etc., which of necessity have to be left until the last moment.

The following changes have been authorized during the past year:

Auxiliary electric-lighting plant for use in engineers' department omitted, and steam substituted for electric motors for operating machinery in engineers' workshop.

Reversing shafts made heavier to increase strength.

Dimensions of circulating pumps slightly modified.

Construction of smoke pipes modified to make pipes conform to change of rake of masts.

A few other slight changes as to details, location, or arrangement of machinery, but not affecting general design, have been authorized.

*Texas*.—Hull under construction at the navy-yard, Norfolk, Va.; machinery by the Richmond Locomotive Works, of Richmond, Va. The main engines are completed, with the exception of crank shafts, and have been erected in the shops; are now taken down, and the various parts are being shipped to Norfolk as rapidly as possible. The crank shafts have been forged at Midvale, and are now being rough-machined by Benet & Miles, of Philadelphia. Nearly all of the auxiliary machinery is completed, or practically so. The construction of the boilers was greatly delayed by a fire, which destroyed the boiler shops and much of the boiler work then done, as mentioned in my report of last year, but now three of the boilers are completed and tested and the fourth one is nearly finished. At the navy-yard, Norfolk, considerable work has been done in fitting outboard valves and other parts of the machinery on board.

The following changes in machinery have been authorized during the past year:

Certain parts of fire mains required by machinery specifications omitted from contractors' obligations, as the Bureau of Construction and Repair had made provision for supplying same.

Test pressure of L. P. cylinders reduced from 100 to 60 pounds.

Several unimportant changes, not affecting design of machinery, regarding material, location, etc., have also been authorized.

*Monterey*.—Building at the Union Iron Works, San Francisco, Cal. The machinery is complete and is erected on board the vessel ready for making steam trials; the engines have been in operation with the vessel secured to the dock.

The only changes that have been authorized during the year were of unimportant details not having any effect upon the design of the machinery.

*Machias* (formerly gunboat No. 5).—Building at the Bath Iron Works, Bath, Me. The machinery for this vessel—engines, boilers, and auxiliary machinery—is, generally speaking, about nine-tenths completed; the main engines are now being erected in the shop for adjustment prior to being placed on board the vessel. The contractors are now about three months behind time with this work (in spite of the fact that they have already been granted one extension of three months beyond the contract time), on account of the difficulty they have had in getting material from the steel makers.

Only three changes in machinery details have been asked for and granted during the year, and they were of slight importance, not affecting the design or cost of machinery.

*Castine* (formerly gunboat No. 6).—Building at the Bath Iron Works, Bath, Me. The remarks made above in reference to the *Machias* apply in all particulars to the *Castine*, the vessels being exactly alike and the work of building their engines is carried on simultaneously in the same shops.

*Montgomery* (formerly cruiser No. 9).—Building at the Columbian Iron Works, Baltimore, Md. The bed plates, V-frames, and cylinders of both main engines are secured in place in the ship, and the work of assembling the other parts of the engines is in progress; the condensers and much of the auxiliary machinery are in place on board, and other auxiliary machinery is being finished in the shops; the boilers and smoke pipes are in place and secured, and the work of fitting uptakes and furnace fittings nearly completed; the fitting of floor plates, gratings, ladders, etc., is now in progress.

The following changes, in addition to those enumerated in my last annual report, have been authorized during the year:

Separate feed-water heaters dispensed with.

Alterations made in lead and arrangement of fire mains.

Additional heaters (radiators) supplied for cabin and torpedo manipulating room.

Modifications made in plan of main and auxiliary steam and exhaust systems of piping.

Besides the above, a number of unimportant changes, not related to the design of machinery, have been allowed.

*Detroit* (formerly cruiser No. 10).—Building at the Columbian Iron Works, Baltimore, Md. The machinery for this vessel is completed and erected on board; the engines have been run for about a week at the wharf to adjust bearings, test joints, etc., during which trial they averaged 130 revolutions per minute, but were at times speeded up to about 150 revolutions. This machinery will probably be reported ready for final trial during the present month.

The changes in machinery that have been authorized during the past year are the same as enumerated above as having been allowed in the case of the *Montgomery*.

*Marblehead* (formerly cruiser No. 11).—Hull building by the assignees of Harrison Loring, at the City Point Works, Boston, Mass.; machinery by N. F. Palmer, jr., & Co., New York. The machinery for this vessel has been completed at the contractor's works, and set up in the shops for adjustment, since which the greater part of it has been boxed and shipped by water to Boston. The boilers, line shafting, bed plates, and many other items are in place on board, and the work of placing auxiliaries, valves, piping, etc., as well as assembling the main engines, is being carried forward.

The following changes have been authorized during the year, besides a few minor ones too unimportant to enumerate:

Modifications made in design of air and circulating pumps.

Eccentric straps to be lined with white metal.

Test pressures of H. P. and I. P. cylinders reduced from 180 to 150 and from 100 to 90 pounds, respectively.

*Cruiser No. 6.*—Building at the Union Iron Works, San Francisco, Cal. The machinery for this vessel—engines, boilers, auxiliaries, etc.—is, generally speaking, about 75 per cent finished. The main engines have been erected in the shop and are practically completed; the boilers are finished and tested in boiler shop and are now having the attachments—furnace doors, bridge walls, grate bars, uptakes, etc.—fitted. The condensers, air and circulating pumps, and much of the other auxiliary machinery, are completed, and have been placed on board; all shafting has been received, and much of it is on board the vessel. Considerable progress has been made in securing valves and installing the systems of piping on board.

The following changes in machinery have been authorized during the year:

Main steam pipes to be strengthened by banding.

Circulating plates in boilers to be omitted and circulation insured by a system of tubes.

A few other changes of no importance were authorized.

*Bancroft* (formerly steel practice vessel).—Building by the Samuel L. Moore & Sons' Company, Elizabethport, N. J. The machinery of this vessel is practically completed and is erected on board, the work remaining to be done consisting mainly in making pipe connections, fitting floor plates, ladders, and gratings, fitting air ducts for forced draft system, and other minor details which have to be done after all the main machinery has been finally secured.

The following changes have been authorized during the past year:

Design of circulating pump engines altered.

Vertical air pumps adopted.

Number and arrangement of safety valves altered.

Several minor changes relating to location, arrangement, or materials for various details have also been allowed.

*New York.*—Building by William Cramp & Sons, Philadelphia, Pa. The machinery for this vessel is nearing completion. The main engines have been erected and adjusted in the shops and are now on board the vessel, being put together with great dispatch. The boilers, shafting, and much of the auxiliary machinery are in the ship, and the work of making pipe connections, fitting boiler attachments, fitting floor plates, gratings, etc., is in progress. This machinery will probably be ready for dock trial within a month.

The following changes, in addition to those enumerated in my last annual report, have been authorized:

Steam substituted for hydraulic power for turning turrets.

Design of thrust blocks modified.

Simple separators substituted for centrifugal ones.

Steam pipes strengthened by banding.

Design of ammunition hoists altered.

A number of minor changes, not affecting the general design of machinery, were also allowed.

*Columbia* (formerly Cruiser No. 12).—Building by Wm. Cramp & Sons, Philadelphia, Pa. The machinery for this vessel (of 21,000 horse power) is about 80 per cent completed; the various parts of the main engines are practically finished and the engines are now being assembled in the shops for adjustment before being placed on board; the main and auxiliary boilers are completed and tested and the work of making and fitting the various boiler attachments is far advanced; the main condensers, air pumps, feed pumps, ash hoists, outboard valves, and many other details are now in place on board the ship. The work of building this machinery has been carried on in a very rapid and satisfactory manner since the contract was undertaken.

Following is a list of the more important changes that have been authorized during the year:

Stuffing boxes where main-injection suction pipes pass through inner bottom to be omitted.

Dimensions of main-check valves altered.

Blake pumps substituted for the air pumps specified.  
Internal feed pipes to be used instead of external feed-water heaters.  
Alteration in details of construction of safety valves.

Independent ventilating system for engine-rooms adopted in place of original plan to make use of fire-room blowers for the purpose.

Slight reduction made in area of propellers.

*Indiana*.—Building by William Cramp & Sons, Philadelphia, Pa. About 45 per cent of the work of building the machinery for this vessel has been accomplished, the greater part of which work has been done during the past year; work of machining all important parts of engines and boilers is in progress, and many details are completed ready for assembling. The auxiliary condensers, air, fire, feed, and bilge pumps, and numerous other auxiliaries are completed. Generally speaking, the progress made on this machinery is very satisfactory.

The following changes have been authorized in the machinery during the year:

Independent starting valves to be omitted.

Blake pump substituted for the type of air pumps called for in the specifications.

Grouping of safety valves altered.

Stuffing boxes on main injection suction pipes omitted at inner bottom.

Number and arrangement of feed check valves modified.

Type of separators changed.

Pitch of screw propellers slightly increased.

Plans are now being prepared involving a change in the hydraulic pumping plant on account of steam having been substituted for water for turning the 8-inch gun turrets.

Besides the above, a number of unimportant changes, not affecting the design of machinery, have been allowed.

*Massachusetts*.—Building by Wm. Cramp & Sons, Philadelphia, Pa. The machinery for this battle-ship is a duplicate throughout of that for the *Indiana*, and is being built together with it in the same shops. The report above regarding progress of work and authorized changes in the case of the *Indiana* applies in every respect to the machinery for the *Massachusetts*.

*Oregon*.—Building by the Union Iron Works, San Francisco, Cal. The machinery for this battle-ship, engines, boilers, and auxiliaries, is about 33 per cent completed. Machine work is in progress on all important parts of main engines and many of the details of same are finished; plates and other material for main boilers are rolled and cut to shape, bolted together, and are now being drilled and fitted for rivetting; turning engines, circulating pumps, ash hoists, and other auxiliaries are completed. The progress made on this machinery during the year is satisfactory.

The main steam pipes have been strengthened by banding, and a slight change in design of air pumps has been authorized; no other changes in machinery of any importance have been made.

The Department having directed that the 8 inch gun turrets of this vessel be operated by steam instead of hydraulic power, plans are now under consideration which will result in a change in the hydraulic pumping plant.

*Harbor-defense ram No. 1*.—Building by the Bath Iron Works, Bath, Me. Work is going forward in the foundry and machine shops on the various details of the engines and boilers for this vessel, about 40 per cent of the entire work being completed. I am obliged to report, however, that the progress thus far made is not satisfactory, as the time allowed for completion (eighteen months) by the contract has already expired, the contract being dated January 28, 1891.

The following changes have been authorized during the past year, together with two or three others of no importance:

Modification made in stern tube bearings.

Design of screw propellers changed.

*Cruiser No. 13*.—Building by Wm. Cramp & Sons, Philadelphia, Pa. About 30 per cent of the work of constructing the engines, boilers, and auxiliary machinery for this vessel has been done; all, or nearly all, of the boiler and other material has been received, and the work of machining the various parts of the engines and boilers is being carried on rapidly. The machinery for this vessel being the same design as that built by the same firm for the *Columbia*, the work of constructing it will be much facilitated by the use of drawings, patterns, etc., already on hand.

The following changes have been allowed during the past year:

Boiler fronts made flat instead of curved.  
 Horseshoe type of thrust bearings adopted.  
 Covers of all main cylinders made of cast iron, instead of cast steel.  
 Location of thrust bearings changed, and lengths of different sections of shafting modified accordingly.  
 Type of throttle valves altered.  
 Independent starting valves omitted.  
 I. P. and L. P. piston valves made of cast iron.  
 Main and bilge injection pipe stuffing boxes omitted in inner bottom.  
 Type of separators changed.  
 Details of design of air pumps modified.  
 Main steam pipes to be of steel instead of copper.  
 Independent system of ventilation adopted for engine rooms instead of using fire-room blowers for that purpose.  
 Size and grouping of main safety valves changed.

Several minor changes, not affecting the general design, have also been allowed.

The three steam tugs described in my last annual report as being nearly completed have undergone their steam trials and been accepted by the Government, having now been in service for several months.

*Torpedo boat No. 2.*—Building by the Iowa Iron Works, Dubuque, Iowa. The greater part of the castings, forgings, etc., for the machinery of this boat are made and the work of constructing the machinery is about one-half completed, which does not show satisfactory progress, as the contract time (12 months) expires the 8th of the present month (October).

The following changes in machinery have been authorized:

Alteration in form of engine bed plates.  
 Shaft struts to be of forged instead of cast steel.  
 Evaporator and distiller located in forward instead of after fire room.  
 All boiler-riveting to be done by hand.

The condition of work on machinery being built at navy-yards for new vessels is as follows:

*Monadnock.*—Building at the navy-yard, Mare Island, Cal. All of the principal parts of the machinery for this vessel are practically completed, the work remaining to be done consisting chiefly in completing details, fitting piping, adjusting the various parts to each other, and in erecting the machinery on board the vessel; the main engines are being assembled in the shops; the boilers are completed and set up in the yard in the relative position which they will have in the ship to facilitate the work of fitting the various boiler attachments, the greater part of which work is done. Generally speaking, the work of building these engines ready for steaming in the ship is about three-fourths completed.

*Cincinnati* (formerly Cruiser No. 7).—Machinery building at the navy-yard, New York. All the main details of engines completed and the engines erected in the shop for adjustment, and to facilitate the work of fitting small attachments; some work remains to be done to complete the larger sizes of the main boilers, boiler fittings, oil and water service on main engines, etc., but the machinery in general was practically completed at the time of the recent fire which damaged it somewhat. The morning of September 17 last the wooden erecting shop, in which these engines were, was destroyed by fire; it was at first supposed that the engines were seriously damaged, but subsequent investigation convinces me that the damage done is merely nominal; two low-pressure cylinders will probably have to be renewed; two cast-iron V frames, all main condenser shells, and one main condenser tube-sheet are damaged beyond repair and will have to be renewed; two fire-room blowers were destroyed also. Other damage consists mainly in small details about the engines, and which can be repaired or renewed as may be necessary. I believe that twenty thousand dollars (\$20,000) will be ample to remedy all damage, and this amount can be expended from the regular appropriation on account of the machinery and leave more than enough to complete the machinery and erect it in the ship.

No changes in machinery of any importance have been made during the year.

*Raleigh* (formerly Cruiser No. 8).—Machinery built at the navy-yard, New York. The main engines have been erected in the shops for test and adjustment, and have

since been shipped to the navy-yard, Norfolk, for erection in the ship, which is the only work remaining to be done on them except a few slight details, such as fitting oil and water service pipes, indicator attachments, lagging, etc.; the boilers have all been completed, tested, and shipped to Norfolk.

No changes of any consequence have been made.

#### DESIGNS OF MACHINERY FOR NEW VESSELS.

Owing to the lateness of the passage of the naval appropriation bill for the fiscal year 1893, this Bureau has not yet entirely finished the designs for machinery for the new vessels provided for by that act.

##### ARMORED CRUISER No. 3.

This vessel is described by the act authorizing its construction as of the general type of the *New York*, and the Bureau will use the design of the *New York's* propelling engines for the new vessel, viz., two vertical, direct acting, triple-expansion engines on each shaft, with disengaging couplings between the pairs of engines. The auxiliary boilers located on the berth deck of the *New York* will be dispensed with in the new design and the space of one of the main boilers will be occupied by two single-ended boilers, which will be a part of the regular boiler-power of the vessel and at the same time available for auxiliary purposes. The new vessel will consequently have five double-ended eight-furnace boilers and two single-ended four-furnace boilers, the aggregate heating surface of which will be slightly greater than that of the boilers of the *New York*.

##### SEAGOING BATTLE SHIP NO. 1.

Entirely new designs of machinery for this vessel are being prepared; there will be two screws each driven by a vertical, direct-acting, triple-expansion engine with cylinders 39, 55, and 85 inches in diameter and 48 inches stroke; when making 112½ revolutions per minute it is estimated that the aggregate horse power will be 11,000, which will drive the ship 16 knots per hour.

There will be three double-ended eight furnace boilers and two single-ended four furnace boilers, the aggregate heating surface of which is about 24,000 square feet and grate surface 756 square feet. These boilers will be 16 feet 9 inches in diameter and about 20 feet long, the two single-ended boilers being located in the space of one double-ended one and are consequently about 10 feet long.

##### LIQUID FUEL FOR TORPEDO BOATS.

The use of liquid fuel for torpedo boats and steam launches appears to be practicable, if the published reports of recent trials can be relied upon. These reports have been generally in the interest of some firm or patent, and the chief difficulties in the way of its use have not been stated.

The advantages are that it can be stowed in much smaller space, can be carried in the lowest part of the boat, is safe enough if refuse of petroleum or especially prepared petroleum be used, enables steam to be regulated with comparative ease, and the supply can be shut off at any time. Experiments at the New York navy-yard, several years since, seem to show that it soon chokes up the tubes and could, therefore, only be used for short runs at high speed where forced draught is necessary.

There is a limit to the amount of petroleum which can be burned for a given size of furnace, and not enough is known about the amount of steam which can be produced with it, as compared with coal, in a given size of boiler. Experiment seems to show considerable gain, enough at any rate to warrant the use of petroleum on several steam launches for the purpose of determining its qualities in service, which is recommended to be done.

The Bureau has asked for an appropriation of \$25,000 to be used for experimental purposes; if this is allowed a portion of the amount can be well spent in making experiments with liquid fuel.

*Estimates of appropriations required for the service of the fiscal year ending June 30, 1894, by the Bureau of Steam Engineering, Navy Department.*

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1893.
<b>STEAM MACHINERY.</b>			
For completion, repairs, and preservation of machinery and boilers of naval vessels, including cost of new boilers, distilling, refrigerating, and auxiliary machinery; preservation of and small repairs to machinery and boilers in vessels in ordinary, receiving and training vessels, repair and care of machinery, of yard tugs and launches.	\$475,000		
For purchase, fitting, repair, and preservation of machinery and tools in navy-yards and stations, and running navy-yard engines .....	40,000		
For incidental expenses for naval vessels, yards, and the bureau, such as foreign postage, telegrams, advertising, freight, photographing, books, stationery, and instruments. ....	10,000		
For purchase, handling, and preservation of all materials and stores. ....	225,000		
(All the above, Act July 19, 1892.)		\$750,000	\$650,000
<b>STEAM MACHINERY (SPECIAL).</b>			
To commence new machinery to replace present engines, boilers, etc., of U. S. S. <i>Chicago</i> (submitted) .....	200,000		
To replace present machinery, boilers, etc., of U. S. S. <i>Dolphin</i> with new engines, etc. (submitted) .....	125,000	325,000	
<b>CONTINGENT.</b>			
For contingencies, drawing materials, instruments, etc., for the drafting room (Act July 19, 1892) .....	1,000	1,000	1,000
<b>SALARIES.</b>			
Chief clerk (Act July 16, 1892) .....	1,800		
One clerk of class 2 (same act) .....	1,400		
One clerk of class 1 (same act) .....	1,200		
One assistant messenger (same act) .....	720		
Two laborers, \$600 each (same act) .....	1,200		
One chief draftsman (same act) .....	2,250		
One draftsman (same act) .....	1,400		
Do. ....	1,000	11,090	11,090
<b>CIVIL ESTABLISHMENT.</b>			
Navy-yard, Portsmouth, N. H.:			
Clerk to Department, per annum (Act July 19, 1892) .....	\$1,200		
One messenger (same act) .....	600		
Navy-yard, Brooklyn, N. Y.:		1,800	
Clerk to Department, per annum (same act) .....	1,400		
One writer (same act) .....	1,000		
One messenger (same act) .....	600		
One writer (submitted) .....	1,000		
Navy-yard, League Island, Pa.:		4,000	
Clerk to Department, per annum (Act July 19, 1892) .....	1,200	1,200	
Navy-yard, Norfolk, Va.:			
Clerk to Department, per annum (Act July 19, 1892) .....	1,300		
One messenger (same act) .....	600		
One writer (submitted) .....	1,000		
Navy-yard, Pensacola, Fla.:		2,900	
One writer (act July 19, 1892) .....	1,000	1,000	
Navy-yard, Mare Island, Cal.:			
Clerk to Department, per annum (Act July 19, 1892) .....	1,400		
One writer (same act) .....	1,000		
One messenger (same act) .....	600		
	3,000	12,900	11,890

*Estimates of appropriations required for the service of the fiscal year ending June 30, 1894, by the Bureau of Steam Engineering, Navy Department--Continued.*

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1893.
IMPROVEMENT OF PLANT.			
Navy-yard, League Island, Pa.: For a complete boiler-making plant of modern tools, (submitted).....	\$45,000	\$45,000	.....
Navy-yard, Norfolk, Va.: Extra tools required to put the yard into condition for building and repairing modern marine machinery with economy and dispatch, including improvements in handling machinery and in the boiler-making plant (submitted) .....	49,205	49,205	.....
EXPERIMENTAL PURPOSES.			
For investigations with a view to increasing the efficiency of naval machinery in the matter of economy, lightness, and increased power by systematic experiments with various kinds of improved steam generators, engines, forced draft, propellers, materials of construction, and such other experimental work in connection with naval machinery as may be found expedient, including the purchase of the necessary material therefor (submitted).	25,000	25,000	.....

Very respectfully,

GEO. W. MELVILLE,

*Engineer in Chief, U. S. Navy, Chief of Bureau.*

Hon. B. F. TRACY,

*Secretary of the Navy.*



## APPENDIX A.

### EVAPORATIVE TESTS OF BOILER FOR FERRY LAUNCH AT THE NAVY-YARD, PORTSMOUTH, N. H.

(FIRST SERIES.)

#### INSTRUCTIONS.

NAVY DEPARTMENT, BUREAU STEAM ENGINEERING,  
*Washington, September 24, 1891.*

SIR: When the Towne boiler for the ferryboat at the yard under your command is completed and in readiness for test the Bureau desires that it be subjected to trial in accordance with the following conditions:

There shall be at least three trials, one under natural draft furnished by the chimney alone, a second under forced draft, with an air pressure in the ash pit equal to about 1 inch of water, and a third under forced draft, with as great an air pressure as can be obtained with the single blower which will be used, but not exceeding 6 inches of water.

For obtaining the forced draft, one of the blowers which was originally intended for the *Galena*, and which is now at the Portsmouth yard, will be used.

The forced draft will be on the closed ash-pit system. Each test will be thoroughly exhaustive to determine all the data required by the forms for boiler tests (blanks for which will be sent you under separate cover), and in accordance with the instructions in these forms, one of which is sent you herewith.

Each test will last eight hours without interruption, and during that time the effort will be to have all the conditions of steam pressure, firing, etc., as uniform as possible.

The feed water will be carefully measured by means of tanks, and if there are not any tanks already on hand for this purpose, it is desired that those which are provided should not be too large, so that it will not take longer than about half an hour to empty each tank when working under forced draft.

The object of this is to enable any number of consecutive hours to be selected from the trial in case the results are not entirely uniform, so as to determine what might be expected if such conditions as obtained during this shorter period held for a longer one. If the tanks are so large that it requires more than an hour to empty them this will be impracticable.

Calorimetric tests to determine the dryness of the steam will be made once an hour and every care will be taken to insure accuracy.

Air-pressure gauges will be attached to the conduit leading from the blower to the ash pit, and also to the ash pit. Care will be taken to connect these gauges so that their indications will be reliable.

If practicable an effort will be made by means of anemometers furnished to register the velocity of air entering the ash pit so that the amount of air used may be determined. Calculations for this purpose will be made and the results included in the report.

In the instruments which will be sent you from the New York yard are a couple of pyrometers, which will be used to determine the temperature of the uptake. As it may happen, however, that these do not give reliable indications, provision will be made for placing in the uptake little pieces of tin, lead, zinc, and antimony, in order that the temperature of the uptake may be determined approximately by noticing which are melted and which are not.

In addition to filling out the blanks furnished, an exhaustive report of the trial will be submitted. This will begin with a complete description of the boiler and all its fittings, including forced draft appliances, the apparatus employed for securing data, the routine of observation, and system of checks, for securing accuracy; and will give complete information relative to the behavior of the boiler during the tests. This will include such items as steadiness of water level, whether there is

any trouble from foaming, effect on the rate of evaporation of fouling of the heating surfaces; also whether, after the tests under forced draft, the boiler shows indications of distress in any part. The report will also note the thickness of fire carried as nearly as can be determined, and all other information which will be valuable or interesting.

Before beginning the tests, of which accurate record is to be kept, preliminary tests of a few hours' duration each will be made, in order to accustom the firemen to working under forced draft, to test the system adopted for observation, in order to insure that all the quantities that are to be measured will be obtained accurately, and to determine the thickness of fire best adapted to secure good results with different conditions of draft. To this end, whenever a tank of water is emptied, whenever the unit of coal is dumped in front of the boiler, and also when it is entirely placed on the fire, the time will be entered and made part of the record; so that in looking over the report afterwards, there shall be every means of determining the accuracy of the work.

Instructions will be sent to the commandant of the New York navy-yard to ship to you two boxes of the test outfit at that yard, which contain the necessary air pressure gauges, anemometers, pyrometers and other instruments which will be required in this work.

After the trials, and when these instruments are no longer needed, please have them carefully cleaned, replaced in their boxes, and shipped to the commandant of the New York navy-yard.

A few days before the time when the boiler will be ready for test, please notify the Bureau, in order that another engineer officer may be ordered to temporary duty at the yard to assist the engineer officers under your command in carrying out the tests.

Very respectfully,

GEO. W. MELVILLE,  
*Engineer in Chief, U. S. Navy, Chief of Bureau.*

THE COMMANDANT,  
*Navy-yard, Portsmouth, N. H.*

## REPORT.

U. S. NAVY-YARD, PORTSMOUTH, N. H.,  
*Chief Engineer's Office, December 9, 1891.*

SIR: In obedience to your order of October 15, 1891, and in accordance with the instructions in the letter of the Bureau of Steam Engineering No. 2816 LL, of September 24, the board appointed for the purpose of testing the Towne boiler met at this place on October 19.

The boiler used in the test is known as the Towne Patent Boiler and consists of a square grate of 15.6 square feet area, which is surrounded by a water box on all sides, having a water space of 2½ inches. Over the grate, in alternate inclined rows running from end to end of the boiler, are 230 1½ inch-tubes, the ends of the fire box forming the tube sheets. The outershell, opposite the ends of the tubes, is fitted with screw plugs filling the holes through which the tubes are put in and expanded into place. Lying across the top of the boiler, in the crutch formed by the inclined tubes, is placed the steam drum extending beyond the sides of the boiler; it is 25 inches in diameter and 5 feet 4½ inches long; it is connected to the top of the water box by 18 2-inch-tubes and with the bottom by two forked down-draft pipes 4½ inches inside diameter at the top. The inside of the drum is fitted with a deflecting plate over the mouth of the entering tubes, and with curved diaphragms for the purpose of deflecting the entering water and preventing it from entering the steam pipe, which is further protected by a dry pipe at the top of the drum.

By means of this arrangement it is intended to procure a good circulation of water by passing it from the water space through the inclined and horizontal tubes to the drum, and thence, through the down-draft pipes, to the bottom again, taking advantage of the different temperatures in the hot tubes and cold down-draft to effect this result.

The boiler is 6 feet 9½ inches long by 5 feet 4½ inches length of drum by 8 feet from bottom of ash pit to base of smoke-pipe, and contains 577 square feet of heating surface.

The feed-water enters the drum after passing through a system of pipes in the uptake. By a system of by-valves it can be made to enter the drum directly without passing through the uptake.

The smoke-pipe is 19 inches diameter, and has a height of 21 feet 7 inches above the grate.

The boiler and piping were temporarily clothed with 1-inch hair felt.

The estimated weight of the boiler, including grate bars but excluding smoke-pipe, is 8,000 pounds.

The weight of water to the top of the upper row of tubes is 2,100 pounds. This was obtained by pumping into the boiler a known quantity from the tanks.

The boiler was entirely new, perfectly tight, and had been cleaned by boiling in it water containing a detergent.

The boiler was inclosed in a temporary shed erected in a wing of the boiler shop. This shed has a sloping roof, and is of the following dimensions: Greatest height, 12 feet; least height, 9 feet; length, 13 feet 3 inches; breadth, 13 feet 3 inches. It is closed on three sides, the fourth having an opening of 6 feet 4 inches by 5 feet 11 inches.

The plant included two wooden tanks of equal capacity; one was placed about a foot above the ground and connected, through its bottom by a pipe to the feed-pump. Above and back of this tank was placed the measuring tank, which, when filled to the overflow, was found to contain 2,052 pounds of water at 65° F. The weight of water used in the computation of each trial was obtained from this by correcting for the mean temperature of the feed water during that trial. All parts of the tanks, pipes, cocks, and feed apparatus were in full view, so that all leaks were visible.

A double acting Knowles steam pump was used during the first two trials, but was then changed for a No. 2 Davidson pump, which was used during the last trial.

The blowers are of the Buffalo Forge Company's make; they were intended, originally, for use on board the U. S. S. *Galena*. The one used for moderate forced draft was driven by single cylinder engine 3½ inches diameter by 4 inches stroke, coupled direct to the blower shaft. The fan is 23 inches in diameter and has five blades, each having a radial length of 6 inches and 5 inches wide; the inlet is 15 inches in diameter and outlet is 9 inches square.

The air from the blower was discharged through a wooden conduit 6 feet long into an opening 15 by 5½ inches in the front of the ash pit. An air pressure gauge was connected to the conduit near the blower and another to the ash pit. An anemometer was secured in the conduit with its dial projecting through the casing, so that the velocity of the entering air was continuously recorded. A damper was fitted to shut off the air when the furnace door was opened. As the highest pressure obtainable with this blower was 1 inch, it was changed before the last trial to one of the following dimensions: Fan 52 inches diameter, having eight blades, each 15 inches wide and having a radial length of 13 inches; the inlet is 28 inches in diameter and the outlet is 19 inches square. It is driven by a single cylinder engine 6 inches diameter by 5 inches stroke, coupled direct to the blower shaft. The air passed from the blower through a wooden conduit 11 feet long into an opening 25 by 8½ inches in the side of the ash pit. Air gauges, anemometer, and damper were fitted as before.

The pyrometers, two in number, were placed horizontally in the up-take above the 2-inch tubes connecting the steam drum with the top of the water box.

As a check on their readings strips of tin, lead, zinc, and antimony were suspended from them in the up-take.

The temperature of the steam was taken by a thermometer placed in a bath of sand in steam pipe leading to the calorimeter, close to where it is tapped into the main steam pipe.

The calorimeter is of the ordinary barrel variety, with a closed top and fitted with a rotating agitator for equalizing the temperature of the water within it; this was placed on a platform scales adjusted to weigh one-tenth of a pound; a standard thermometer was used to take the temperature. A drain valve was fitted to the bottom of the barrel. The steam to be tested was brought to it through a 1-inch pipe 17 feet long, connected to a perforated tube inside the steam pipe close to the boiler and well protected from radiation. This pipe was connected to a hose for admitting steam to the calorimeter by a coupling in which was placed a diaphragm of thin copper with a one-eighth inch hole through which the steam was drawn.

Short preliminary runs were made during several days to familiarize the firemen and attendants with their duties, and to see that the various appliances were in proper working order. While making these experimental tests it was found that the wrought iron grate bars used in this boiler warped so badly that it was impossible to continue the trial owing to the holes thereby made in the fire. To prevent this, a pin was fitted in the middle of each alternate bar of such length that the ends were almost in contact with the adjacent bars; after this no further trouble was experienced.

The first test, marked A, took place on October 22, under natural draft, and continued seven and one-half hours. With cold water in the boiler, a wood fire was started and continued until steam at 160 pounds had blown off for about eight minutes. The embers were then hauled, a new fire was started, the height of the water in the glass gauge was noted, and the trial began. The record of the water used was made from the measuring tank, and at the end of the test the water remaining

in the feed tank, after bringing the water to its original height in the glass, was deducted from that recorded. The temperature of the feed was taken in the feed tank.

The coal was filled into a basket on a platform scales placed near the boiler, to a fixed weight and dumped in front of the furnace door. Separate tallies were kept by the coal passer and a member of the board. When a basket of coal was placed on the floor the time was noted, and again when it had all been fed to the furnace; the coal column in the log was prepared from this record.

The fire was allowed to burn down near the end of the trial until nothing was left but ashes and cinders. When no more steam was formed the trial ended.

The steam generated was blown into the atmosphere through a screw stop-valve under the charge of an attendant, who regulated the flow to maintain a constant pressure of 160 pounds per gauge.

The calorimeter tests were made at regular hourly intervals, the usual precaution being taken against the radiation and to secure accurate weights and temperatures. The water in the barrel was well agitated. A slight flow of steam was constantly passing through the hose which was thus well heated before being inserted in the barrel. Accuracy in weight was obtained by the use of counterweights of one-tenth pound each.

One of the pyrometers was out of order; the reading of the other, which is recorded in the log, agreed very well with the melting points of the strips of metal suspended in the uptake. The water in the glass remained steady except when the stop valve was opened suddenly, when the water would rise out of the glass, resuming its former level when the valve was closed. The feed pump required very little attention to keep the water at the level of the second row of tubes where it was carried during this test. Subsequent trials showed that the water could safely be carried at the level of the third row, and with much better results from a calorimetric point of view.

There was a slight leakage from some of the plugs and about the joints of the down-draft pipes. The fire was carried about 6 inches thick, and the firing was done at intervals of about twenty-five minutes. During this test the strip of tin was melted in the up-take.

The second test, marked B, took place on October 23, with moderate forced draft and continued eight hours. The small blower before described was used. The data were taken as before. The fire was carried about 8 inches thick and the firing was done at intervals of fifteen minutes. After test it was found that tin, lead, and zinc were melted in the up-take; the strip of antimony remained intact.

The behavior of the water was the same as in the first trial, but more difficulty was had in keeping it at a constant level. This was probably due to imperfections in the pump, which is old and which was replaced after this trial by a new one.

It was found during this trial that a pressure greater than 1 inch could not be obtained with this blower, so the large blower, before described, was substituted. Several experimental tests were made to determine the greatest pressure at which a trial could be successfully made. It was found impracticable to use more than 4 inches, the small size of the furnace door making it impossible to carry the fire thick enough for higher pressures.

The third test, marked "C," took place October 30, and continued under 4 inches air pressure eight hours. The manner of taking data was unchanged, except that the unit of coal was made larger than in former trials. The water was carried lower during this trial than before, and the feed, consequently, required much closer attention. It was found that the best height for the water was at the top of the third row of tubes. The opening of the furnace door had a marked effect on the water level, causing it to drop about 4 inches. The sudden opening of the stop valve caused the water to rise from 6 to 8 inches, falling to its original position when the valves were closed.

The firing was done at intervals of ten minutes, and it was found necessary to clean the fire once every hour. The fire was carried about ten inches thick, a greater thickness being impossible owing to the low height of the furnace door. It is thought that better results might have been obtained with a heavier fire, the anemometer showing that air was supplied in excess of the amount necessary for perfect combustion. The strip of antimony suspended in the uptake was melted.

Between the several trials it became necessary at various times to remove leaky plugs. These were replaced by composition plugs, which proved very satisfactory. Although many of them were used not one was found to leak.

During the first two tests there was some priming at times. In the last trial, when the water was carried lower, none was evident.

The coal used was anthracite, egg size. The board was unable to learn where it was mined, nor could any analysis of it be had. It contained a very large percentage of ashes and some clinker, necessitating frequent cleaning of the fire.

After the final trial the boiler was carefully examined, but showed no signs of having been unduly strained. The only leaks were a few plugs and about the joints of the down-draft pipes.

Very respectfully,

JOSEPH TRILLEY,  
Chief Engineer, U. S. Navy.  
M. A. ANDERSON,  
Assistant Engineer, U. S. Navy.  
W. H. CHAMBERS,  
Assistant Engineer, U. S. Navy.

The COMMANDANT,  
U. S. Navy-yard, Portsmouth, N. H.

COMMANDANT'S OFFICE.  
Approved December 10, 1891.  
C. C. CARPENTER,  
Captain, U. S. Navy, Commandant.

TABLE A 1.—*Evaporative test of a Towne boiler for ferryboat at navy-yard, Portsmouth, N. H., on the 22d of October, 1891.*

Reference number.	Time.	Steam pressure by gauge at boilers.	Barometer, mercurial.	Fuel consumed.	Dry refuse.	Water fed to boilers.	Temperatures, Fahr.				Velocity of air entering ash pit in feet per minute.	Cubic feet of air per minute.
							Feed-water, $t_1$ .	Steam by thermometer at boilers.	In uptake.	Atmosphere.	Fire room.	
1	8.50	160	Ina.	Lbs.	Lbs.	Lbs.						
2	9.50	160	30.12	*51	.....	1,373.6	50.0	330	400	50	65	.....
3	10.50	160	30.11	480	.....	1,334.2	50.0	330	420	50	68	230
4	11.50	160	30.07	170	.....	974.6	53.5	335	420	52	81	250
5	12.50	160	30.04	160	.....	967.3	53.5	345	400	53	82	220
6	1.50	160	30.03	170	.....	930.3	54.0	345	380	54	80	230
7	2.00	160	30.02	140	.....	1,219.9	54.0	345	395	54	74	240
8	3.50	160	30.04	80	.....	1,256.7	52.0	345	410	52	74	250
9	4.25	160	30.04	.....	.....	284.7	50.0	345	415	50	72	300
0		160	30.08	.....	257	.....	.....	310	350	50	60	.....
		160	30.06	1,251	257	8,171.4	52.13	340	398.9	51.5	73.9	245.7

\* Wood.

Tin was melted in uptake. Fire was kept about 6 inches thick throughout trial.

TABLE A 2.—*Calorimetric tests of the steam from a Towne boiler for ferryboat, at navy-yard, Portsmouth, N. H., on the 22d of October, 1891.*

Number of test	Time.		Average pressure of steam in pounds, absolute, P.	Weights.			Temperatures.			Q.	Temperature of steam by thermometer.
	At beginning.	At end.		Calorimeter, b.	W + b.	W.	W + b + w.	w.	t.		
1	9.00	9.10	174.7	87.4	423.2	335.8	442.1	18.9	111.0	50.0	.8710
2	10.02	10.18	174.7	87.4	421.3	333.9	439.2	17.9	109.5	58.0	.8563
3	11.00	11.15	174.7	87.4	424.0	336.6	442.4	18.4	112.0	58.0	.8946
4	11.55	12.08	174.7	87.4	423.2	335.8	442.4	19.2	115.0	58.0	.9070
5	1.04	1.17	174.7	87.4	424.3	336.9	441.9	17.6	112.0	58.0	.9064
6	1.55	2.13	174.7	87.4	424.4	337.0	442.7	18.3	111.0	55.0	.9229
7	2.55	3.17	174.7	87.4	423.1	335.7	444.9	18.8	112.0	58.0	.8859
8	4.06	4.24	174.7	87.4	425.6	338.2	444.4	18.8	111.0	55.0	.8735
Mean values of Q and temperature.....											.8871

Percentage of moisture in the steam, 100 (1—Q), 11.29.

REMARKS: The tables used in computing the values of Q and the potential evaporation are found in Thurston's Hand-Book of Engine and Boiler Trials, 1890.

From the foregoing tables the following data are obtained, from which the computations for the potential evaporation are made:

Average steam pressure, absolute, $p$ .....	174.70
Average temperature of the feed water, $t_1$ .....	52.13
(a) Number of pounds of water vaporized, $W_1 \times Q$ .....	7,248.66
(b) Number of pounds of water carried over with the steam, $W_1 (1-Q)$ .....	922.74
Total heat of steam at pressure $p$ .....	1,194.92
Total heat of water at temperature $t_1$ .....	20.13
(c) Units of heat required to vaporize 1 pound of water from a temperature $t_1$ and under a pressure $p$ .....	1,174.79
(c.) Units of heat required to raise the temperature of 1 pound of water from $t_1$ to the temperature due to the pressure $p$ .....	322.03
(d) Units of heat required to vaporize 1 pound of water from and at a temperature of 212° and under atmospheric pressure.....	966.07
Total heat required to vaporize the water, $a \times c$ .....	8,515,653.28
Total heat required to raise the temperature of the water, $b \times c_1$ .....	297,146.27
(e) Total heat obtained from the fuel as measured by the steam discharged.....	8,812,799.55
(f) Units of heat obtained per pound of fuel.....	7,044.64
(g) Units of heat obtained per pound of combustible.....	8,865.99
(e) Potential evaporation per pound of fuel from a temperature $t_1$ and under a pressure $p$ .....	5.99
(e) Potential evaporation per pound of combustible from a temperature $t_1$ and under a pressure $p$ .....	7.55
(f) Equivalent potential evaporation per pound of fuel from and at a temperature of 212° and under atmospheric pressure.....	7.29
(g) Equivalent potential evaporation per pound of combustible from and at a temperature of 212° and under atmospheric pressure.....	9.18

TABLE A 3.—*Recapitulation of the results of the evaporative and calorimetric tests of a Towne boiler for ferryboat at Portsmouth, N. H., October 22, 1891.*

[NOTE. --All weights are given in pounds and all temperatures in degrees Fahrenheit.]

#### TOTAL QUANTITIES.

Duration of test, in hours.....	7.58
Fuel consumed.....	1,251
Refuse from fuel, in dry ashes, dust, and clinkers.....	257
Combustible consumed.....	994
Water fed to boiler, by tank measurement, $W_1$ .....	8,171.4
Per cent of the fuel in dry refuse, etc.....	20.54

#### AVERAGE QUANTITIES.

Temperature of feed-water $t_1$ .....	52.13
Temperature of steam, by thermometer.....	340
Temperature of uptake.....	308.9
Temperature of atmosphere.....	51.5
Temperature of fire-room.....	73.9
Barometer, in inches of mercury.....	30.06
Pressure of steam at boiler, in pounds, per square inch above a perfect vacuum, 14.7 + pressure by gauge in pounds, $p$ .....	174.7

Rates of combustion.	Fuel.	Combustible.
	Pounds.	Pounds.
Amount consumed per hour.....	165.04	131.26
Amount consumed per hour per square foot of grate surface.....	10.58	8.41
Amount consumed per hour per square foot of heating surface (exterior).....	0.285	0.227

Vaporization in pounds of water.	Per pound of fuel.	Per pound of combustible.
Apparent evaporation, by tank measurement, from a temperature $t_1$ and under a pressure $p$ .....	6.53	8.22
Equivalent apparent evaporation from and at 212° and under atmospheric pressure.....	7.94	10.00
Actual evaporation, into steam of quality $Q$ , from a temperature $t_1$ and under a pressure $p$ .....	5.79	7.29
Equivalent actual evaporation from and at 212° and under atmospheric pressure.....	7.04	8.87
Potential evaporation, or evaporation had all the heat obtained from fuel been utilized in converting the water in boiler into dry saturated steam from a temperature $t_1$ and under a pressure $p$ .....	5.99	7.55
Equivalent potential evaporation from and at 212° and under atmospheric pressure.....	7.29	9.18

TABLE B 1.—*Evaporative test of a Towns boiler for ferryboat at navy-yard, Portsmouth, N. H., on the 23d of October, 1891.*

Reference number.	Time.	Steam pressure by gauge at boilers.	Barometer (mercurial).	Fuel consumed.	Dry refuse.	Water fed to boilers.	Temperatures, Fahr.					Air pressure in inches of water.	Revolutions of blowing engines.	Velocity of air entering ash pit in feet per minute.	Cubic feet of air per minute.
							Feed-water $t_1$ .	Steam by thermometer at boilers.	In uptake.	Atmosphere.*	Fire-room.				
			<i>Ins.</i>	<i>Lbs.</i>	<i>Lbs.</i>	<i>Lbs.</i>						<i>Ins.</i>	<i>Ins.</i>		
1	9.00	160	29.86	*52			47	340	415	42	57				
2	10.00	160	29.85	750		1,397	47	340	550	43	65		900	3,628	2,068
3	11.00	160	29.83	375		2,783.7	50	342	570	44	68		900	3,400	1,938
4	12.00	160	29.80	375		2,383.1	50	345	650	45	68		900	3,380	1,927
5	1.00	160	29.77	450		2,413.7	50.5	345	640	46.5	68		900	3,380	1,927
6	2.00	160	29.74	450		2,385.5	50.5	345	650	47	70		900	3,240	1,847
7	3.00	160	29.74	450		2,135.7	50.5	342	670	49	72		900	3,050	1,738
8	4.00	160	29.75	445		1,986.6	50	345	630	46	72		900	3,025	1,724
9	5.00	160	29.76		626	1,702.7	50	340	580	43	68		900	3,590	2,046
10	5.10					43.8									
		160	29.79	3,347	626	17,231.8	49.5	343	595	45.05	67.6		900		

\* Wood.

Fire was kept about 8 inches thick during trial. Highest reading of pyrometer, 730. Tin, lead, and zinc were melted in uptake. The blower was started at 9.10. A pressure of three-fourths inch was obtained at 10.

TABLE B 2.—*Calorimetric tests of the steam from a Towns boiler for ferryboat at navy-yard, Portsmouth, N. H., on October 23, 1891.*

Number of test.	Time.		Average pressure of steam in pounds absolute. P.	Weights.					Temperatures.			Q.	Temperature of steam by thermometer.
	At beginning.	At end.		Colorimeter. b.	W+b.	W.	W- $\frac{1}{2}$ b + w.	w.	t <sub>1</sub> .	t.			
1	9.20	9.36	174.7	87.7	421.5	333.8	441.8	20.3	112.0	50.0	.8888	340	
2	10.07	10.20	174.7	87.7	423.9	336.2	448.6	24.7	112.5	53.0	.8434	340	
3	11.04	11.15	174.7	87.7	420.4	332.7	439.6	19.2	111.0	53.0	.8707	342	
4	12.03	12.15	174.7	87.7	421.2	333.5	441.5	20.3	113.0	52.0	.8606	345	
5	1.02	1.16	174.7	87.7	425.0	337.3	446.0	21.0	116.0	52.5	.9142	345	
6	2.03	2.15	174.7	87.7	422.5	334.8	440.9	18.4	110.5	53.0	.9185	345	
7	3.05	3.08	174.7	87.7	422.9	335.2	442.2	19.3	111.0	52.5	.8326	342	
8	4.05	4.21	174.7	87.7	422.5	334.8	442.0	19.5	112.5	53.0	.8919	345	
Mean values of Q and temperature .....												.8601	343

Percentage of moisture in the steam, 100 (1- $Q$ )..... 13.99

REMARKS: The tables used in computing the value of  $Q$ , and the potential evaporation are found in "Thurston's Hand Book of Engine and Boiler Trials," 1890.

From the foregoing tables the following data are obtained, from which the computations for the potential evaporation are made:

Average steam pressure, absolute, $p$ .....	174.7
Average temperature of the feed-water $t_1$ .....	49.5
(a) Number of pounds of water vaporized $W_1 \times Q$ .....	14,821.07
(b) Number of pounds of water carried over with the steam $W_1 (1-Q)$ .....	2,410.73
Total heat of steam at pressure $p$ .....	1,194.93
Total heat of water at temperature $t_1$ .....	17.5
(c) Units of heat required to vaporize one pound of water from a temperature $t_1$ , and under a pressure $p$ .....	1,177.43
(c') Units of heat required to raise the temperature of one pound of water from $t_1$ to the temperature due to the pressure $p$ .....	324.66
(d) Units of heat required to vaporize one pound of water from and at a temperature of 212° and under atmospheric pressure .....	908.87

Total heat required to vaporize the water $a \times c$ .....	17,450,200
Total heat required to raise the temperature of the water $b \times c$ .....	782,670
(e) Total heat obtained from the fuel, as measured by the steam discharged .....	18,232,870
(f) Units of heat obtained per pound of fuel .....	5.448
(g) Units of heat obtained per pound of combustible .....	6,701.5
<i>f</i> Potential evaporation per pound of fuel, from a temperature $t_1$ , and under a pressure $p$ .....	4.63
<i>c</i> .....	
<i>g</i> Potential evaporation per pound of combustible, from a temperature $t_1$ and under a pressure $p$ .....	5.69
<i>f</i> Equivalent potential evaporation per pound of fuel, from and at a temperature of $212^\circ$ and under atmospheric pressure .....	5.64
<i>d</i> Equivalent potential evaporation per pound of combustible from and at a temperature of $212^\circ$ and under atmospheric pressure .....	6.94

TABLE B 3.—*Recapitulation of the results of the evaporative and calorimetric tests of a Towne boiler for ferry boat, at Portsmouth, N. H., October 23, 1891.*

[NOTE.—All weights are given in pounds and all temperatures in degrees Fahrenheit.]

## TOTAL QUANTITIES.

Duration of test, in hours .....	8.16
Fuel consumed .....	3,347
Refuse from fuel, in dry ashes, dust, and clinkers .....	626
Combustible consumed .....	2,721
Water fed to boiler, by tank measurement, $W_1$ .....	17,231.8
Per cent of the fuel in dry refuse, etc .....	18.7

## AVERAGE QUANTITIES.

Temperature of feed-water, $t_1$ .....	49.5
Temperature of steam, by thermometer .....	342.66
Temperature of uptake .....	595
Temperature of atmosphere .....	45.05
Temperature of fire-room .....	67.55
Barometer, in inches, of mercury .....	29.79
Pressure of steam at boiler, in pounds per square inch, above a perfect vacuum, $14.7 +$ pressure by gauge, in pounds, $p$ .....	174.7
Air pressure, in inches of water, in ash pit .....	0.75
Air pressure, in inches of water, in air duct .....	0.875
Revolutions of blowing engines, per minute .....	900

Rates of combustion.	Fuel.	Combustible.
	<i>Pounds.</i>	<i>Pounds.</i>
Amount consumed per hour .....	409.89	333.22
Amount consumed per hour per square foot of grate surface .....	26.27	21.36
Amount consumed per hour per square foot of heating surface (exterior) .....	.709	.564
Vaporization in pounds of water.	Per pound of fuel.	Per pound of combustible.
Apparent evaporation, by tank measurement, from a temperature $t_1$ , and under a pressure $p$ .....	5.15	6.33
Equivalent apparent evaporation from and at $212^\circ$ and under atmospheric pressure .....	6.27	7.72
Actual evaporation, into steam of quality $Q$ , from a temperature $t_1$ , and under a pressure $p$ .....	4.43	5.44
Equivalent actual evaporation from and at $212^\circ$ and under atmospheric pressure .....	5.39	6.64
Potential evaporation, or evaporation had all the heat obtained from fuel been utilized in converting the water in boiler into dry saturated steam from a temperature $t_1$ , and under a pressure $p$ .....	4.63	5.69
Equivalent potential evaporation from and at $212^\circ$ and under atmospheric pressure .....	5.64	6.94



TABLE C 1.—*Evaporative test of a Towne boiler for ferry boat at navy-yard, Portsmouth, N. H., on October 30, 1891.*

Reference number.	Time.	Steam pressure by gauge at boilers.	Barometer (mercurial).	Fuel consumed.	Dry refuse.	Water fed to boilers.	Temperatures, Fahr.					Air pressure in inches of water.		Revolutions of blowing engines.	Velocity of air in duct, in feet per minute.	Cubic feet of air per minute.
							Feed water, $t_1$ .	Steam by thermometer at boilers.	In uptake.	Atmosphere.	Fire-room.	Ash pit.	Air duct.			
			Ina.	Lbs.	Lbs.	Lbs.						Ina.	Ina.			
1	8.55	160 30.51	(*) 50	900		48	365	1,000	40	62		4	4 1/2	600		
2	9.55	160 30.47		900		48	365	1,020	42	66		4	4 1/2	600	2,913	4,515
3	10.55	160 30.45		480		50	362	1,120	48	74		4	4 1/2	600	2,949	4,571
4	11.55	160 30.37		600		50	362	1,140	56	75		4	4 1/2	600	3,088	4,786
5	12.55	160 30.32		870		50	365	1,160	60	82		4	4 1/2	600	3,428	4,728
6	1.55	160 30.26		820		50	360	1,160	64	85		4	4 1/2	600	2,451	3,799
7	2.55	160 30.22		830		50	370	1,160	64.5	90		4	4 1/2	600	2,755	4,270
8	3.55	160 30.21		750		50	365	1,150	62	84		4	4 1/2	600	2,633	4,081
9	4.55	160 30.22		270	1,431	25,202	50	350	1,140	60	80	4	4 1/2	600	3,163	4,903
		160 30.34		6,470	1,431	25,202	49.56	362.6	1,116.4	55.17	77.55	4	4 1/2	600	2,875.2	4,456.6

\* Wood.

Area of air duct at anemometer—1.55.

Blower was shut off about 10 per cent of total time for fixing, etc.

The maximum temperature recorded by pyrometer was 1,180. Antimony was melted in uptake.

Fire was carried 10 inches thick.

Fire was started at 8.10 o'clock; 4 inches air-pressure was had at 8.55. Blower was stopped and steam ceased forming at 5.10.

TABLE C 2.—*Calorimetric tests of the steam from a Towne boiler for ferry boat at navy-yard, Portsmouth, N. H., on October 30, 1891.*

Number of test.	Time.		Average pressure of steam in pounds, absolute.	Calorimeter.	Weights.				Temperatures.		Q.	Temperature of steam by thermometer.
	At beginning.	At end.			W + b.	W.	W + b + w.	w.	$t_1$ .	$t_2$ .		
			P.	b.								
1	9.00	9.13	174.7	88.6	424.9	336.3	445.4	20.5	112.5	50	.8962	365
2	10.09	10.19	174.7	88.6	424.5	335.9	444.9	20.4	117.5	55	.9060	365
3	10.59	11.09	174.7	88.6	420.9	332.3	440.6	19.7	119.0	56.5	.9380	362
4	11.50	12.00	174.7	88.6	420.3	331.7	438.1	17.8	112.0	56	.9178	362
5	1.07	1.19	174.7	88.6	424.5	335.9	442.4	17.0	112.0	55.5	.9367	365
6	2.02	2.12	174.7	88.6	424.6	336.0	442.3	17.7	113.5	56.5	.9753	360
7	2.55	3.05	174.7	88.6	424.2	335.6	440.8	16.6	110.0	57.5	.9357	370
8	4.01	4.13	171.7	88.6	424.2	335.6	442.7	18.5	113.0	55	.9284	365
Mean values of Q and temperature.....											.9293	362.6

Percentage of moisture in the steam, 100 (1-Q)..... 7.074

REMARKS.—The tables used in computing the values of Q and the potential evaporation are found in Thurston's Hand Book of Engine and Boiler Trials, 1890.

From the foregoing tables the following data are obtained, from which the computations for the potential evaporation are made:

Average steam pressure, absolute, $p$ .....	174.7
Average temperature of the feed water, $t_1$ .....	49.66
(a) Number of pounds of water vaporized, $W_1$ S Q.....	23,418
(b) Number of pounds of water carried over with the steam, $W_1$ (1-Q).....	1,784
Total heat of steam at pressure $p$ .....	1,194.92
Total heat of water at temperature $t_1$ .....	17.66
(c) Units of heat required to vaporize 1 pound of water from a temperature $t_1$ and under a pressure $p$ .....	1,177.36
(d) Units of heat required to raise the temperature of 1 pound of water from $t_1$ to the temperature due to the pressure $p$ .....	324.49
(e) Units of heat required to vaporize 1 pound of water from and at a temperature of 212° and under atmospheric pressure.....	966.07

Total heat required to vaporize the water, $a \times c$ .....	27,571,418.48
Total heat required to raise the temperature of the water, $b \times c^1$ .....	578,890.16
<i>e</i> ) Total heat obtained from the fuel, as measured by the steam discharged .....	28,150,306.64
<i>f</i> ) Units of heat obtained per pound of fuel .....	4,350.89
<i>g</i> ) Units of heat obtained per pound of combustible .....	5,586.48
<i>f</i> Potential evaporation per pound of fuel, from a temperature $t_1$ and under a pressure $p$ .....	3.69
<i>g</i> Potential evaporation per pound of combustible, from a temperature $t_1$ and under a pressure $p$ .....	4.75
<i>f</i> Equivalent potential evaporation per pound of fuel, from and at a temperature of $212^\circ$ and under atmospheric pressure .....	4.50
<i>g</i> Equivalent potential evaporation per pound of combustible, from and at a temperature of $212^\circ$ and under atmospheric pressure .....	5.79

TABLE C 3.—*Recapitulation of the results of the evaporative and calorimetric tests of a Towne boiler for ferryboat at Portsmouth, N. H., October 30, 1891.*

[NOTE.—All weights are given in pounds and all temperatures in degrees Fahrenheit.]

## TOTAL QUANTITIES.

Duration of test in hours .....	9
Fuel (anthracite) consumed .....	6,470
Refuse from fuel, in dry ashes, dust, and clinkers .....	1,431
Combustible consumed .....	5,039
Water fed to boiler, by tank measurement, $W_1$ .....	25,202
Per cent of the fuel in dry refuse, etc .....	22.12

## AVERAGE QUANTITIES.

Temperature of feed water, $t_1$ .....	49.66
Temperature of steam, by thermometer .....	362.6
Temperature of uptake .....	1,116.4
Temperature of atmosphere .....	55.17
Temperature of fire room .....	77.55
Barometer, in inches of mercury .....	30.34
Pressure of steam at boiler, in pounds per square inch above a perfect vacuum, $14.7 +$ pressure by gauge in pounds, $p$ .....	174.7
Air-pressure, in inches of water, in air duct .....	4.25
Air-pressure, in inches of water, in ash pit .....	4
Revolutions of blowing engines, per minute .....	600

Rates of combustion.	Fuel.	Combustible.
	<i>Pounds.</i>	<i>Pounds.</i>
Amount consumed per hour .....	718.88	559.88
Amount consumed per hour per square foot of grate surface .....	46.08	35.80
Amount consumed per hour per square foot of heating surface (exterior) ..	1.245	.969

Vaporization in pounds of water.	Per pound of fuel.	Per pound of combustible.
Apparent evaporation, by tank measurement, from a temperature $t_1$ and under a pressure $p$ .....	3.89	5.00
Equivalent apparent evaporation from and at $212^\circ$ and under atmospheric pressure .....	4.75	6.10
Actual evaporation, into steam of quality $Q$ , from a temperature $t_1$ and under a pressure $p$ .....	3.62	4.65
Equivalent actual evaporation from and at $212^\circ$ and under atmospheric pressure .....	4.41	5.67
Potential evaporation, or evaporation had all the heat obtained from fuel been utilized in converting the water in boiler into dry saturated steam from a temperature $t_1$ and under a pressure $p$ .....	3.69	4.75
Equivalent potential evaporation from and at $212^\circ$ and under atmospheric pressure .....	4.50	5.79

From the foregoing tables the following data are obtained, from which the computations for the potential evaporation are made:

Average steam pressure absolute, $p$ .....	174.7
Average temperature of the feed water, $t_1$ .....	45.3
(a) Number of pounds of water vaporized, $W_1 \times Q$ .....	8,129.5
(b) Number of pounds of water carried over with the steam, $W_1 (1-Q)$ .....	770.5
Total heat of steam at pressure $p$ from $32^\circ$ .....	1,194.94
Total heat of water at temperature $t_1$ from $32^\circ$ .....	13.38
(c) Units of heat required to vaporize 1 pound of water from a temperature $t_1$ and under a pressure $p$ .....	1,181.56
(c') Units of heat required to raise the temperature of 1 pound of water from $t_1$ to the temperature due to the pressure $p$ .....	329.47
(d) Units of heat required to vaporize 1 pound of water from and at a temperature of $212^\circ$ and under atmospheric pressure .....	965.8
Total heat required to vaporize the water, $a \times c$ .....	9,605.800
Total heat required to raise the temperature of the water, $b \times c'$ .....	253,850
(e) Total heat obtained from the fuel as measured by the steam discharged .....	9,859,650
(f) Units of heat obtained per pound of fuel .....	7,048
(g) Units of heat obtained per pound of combustible .....	7,888
$e$ Potential evaporation per pound of fuel from a temperature $t_1$ and under a pressure $p$ .....	5.96
$e'$ Potential evaporation per pound of combustible from a temperature $t_1$ and under a pressure $p$ .....	6.68
$f$ Equivalent potential evaporation per pound of fuel from and at a temperature of $212^\circ$ and under atmospheric pressure .....	7.30
$f'$ Equivalent potential evaporation per pound of combustible from and at a temperature of $212^\circ$ and under atmospheric pressure .....	8.17

TABLE A 3.—Recapitulation of the results of the evaporative and calorimetric tests.

[NOTE.—All weights are given in pounds and all temperatures in degrees Fahrenheit.]

#### TOTAL QUANTITIES.

Duration of test, in hours .....	6.25
Fuel (bituminous) consumed .....	1,399
Refuse from fuel, in dry ashes, dust, and clinkers .....	149
Combustible consumed .....	1,250
Water fed to boiler, by tank measurement, $W_1$ .....	8,900
Per cent of the fuel in dry refuse, etc. ....	10.65

#### AVERAGE QUANTITIES.

Temperature of feed water, $t_1$ .....	45.3
Temperature of steam, by thermometer .....	338.2
Temperature of uptake .....	above $608^\circ$
Temperature of atmosphere .....	51.1
Temperature of fire room .....	69.6
Barometer in inches of mercury .....	29.96
Pressure of steam at boiler, in pounds per square inch above a perfect vacuum, $14.7 +$ pressure by gauge in pounds, $p$ .....	174.7

Rates of combustion.	Fuel.	Combustible.
	Pounds.	Pounds.
Amount consumed per hour .....	223.85	200.00
Amount consumed per hour per square foot of grate surface .....	14.35	12.82
Amount consumed per hour per square foot of heating surface (exterior) .....	.39	.35

Vaporization, in pounds of water.	Per pound of fuel.	Per pound of combustible.
Apparent evaporation, by tank measurement, from a temperature $t_1$ and under a pressure $p$ .....	6.36	7.12
Equivalent apparent evaporation from and at $212^\circ$ and under atmospheric pressure .....	7.78	8.71
Actual evaporation, into steam of quality $q$ , from a temperature $t_1$ and under a pressure $p$ .....	5.82	6.51
Equivalent actual evaporation from and at $212^\circ$ and under atmospheric pressure .....	7.12	7.97
Potential evaporation, or evaporation had all the heat been utilized in converting the water in boiler from a temperature $t_1$ and under a pressure $p$ .....	96	6.68
Equivalent potential evaporation from and at $212^\circ$ and under atmospheric pressure .....		8.17

During the fifth test, with 2-inch air pressure burning anthracite coal, the grate bars sagged in the center, and some of them came down. This necessitated slowing the blower, and brought the trial to a close at the end of the fifth hour.

There was very little priming during any of the trials. The water was carried a little below the third row of tubes from the top.

After the trial the boiler was carefully examined, but showed no signs of having been unduly strained. There were slight leaks in three plugs and one seam.

Very respectfully,

JOSEPH TRILLEY,  
Chief Engineer, U. S. Navy.  
M. A. ANDERSON,  
Assistant Engineer, U. S. Navy.

The COMMANDANT.

U. S. NAVY-YARD, PORTSMOUTH, N. H.,  
COMMANDANT'S OFFICE.  
Approved December 14, 1891.  
C. C. CARPENTER,  
Captain, U. S. Navy, Commandant.

NOTE.—Peabody's steam tables were used in the computations connected with the second series of trials.

TABLE A 1.—*Evaporative test of Towne boiler for ferry boat at Portsmouth, N. H., on the 23d of November, 1891.*

NATURAL DRAFT.—BITUMINOUS COAL.

Reference number.	Time.	Steam pressure, by gauge, at boilers.	Barometer (mercurial).				Temperatures, F.					Velocity of air entering ash pit, feet per minute.	Cubic feet entering ash pit per minute.
				Fuel consumed.	Dry refuse.	Water fed to boilers.	Feed water, $t_f$ .	Steam, by thermometer, at boilers.	In uptake.	Atmosphere.	Fire room.		
			<i>Ins.</i>	<i>Lbs.</i>	<i>Lbs.</i>	<i>Lbs.</i>							
1	9.15	160	30.17	(49)450			44	330	425	51	64		
2	10.15	160	.12	225		1,221.3	46	332	320	51	66	200	230
3	11.15	160	.07	150		1,361.5	46	335	400	52	68	240	276
4	12.15	160	.03	225		1,371.6	46	336	330	50	70	300	345
5	1.15	160	29.98	150		1,361.5	46	337	350	51	72	315	362
6	2.15	160	.07	150	149	1,301.4	45	341	390	51	70	475	548
7	3.15	160	.95			1,361.5	44	342	500	51	70	385	443
8	3.30	Trial ended.				951.2							
	1.00	29.96		1,309	149	8,900	45.3	336.2	388	51.1	68.6	319.2	367

\* Wood reduced to equivalent in coal.

Lead melted in uptake; temperature above 608°.

Eight bricks in uptake.

TABLE A 2.—*Calorimetric tests of Towne boiler of ferry boat at Portsmouth, N. H., on the 23d of November, 1891.*

Number of test.	Time.		Average pressure of steam in pounds absolute.	Weights.					Temperatures.		Q.	Temperature of steam, by thermometer.
	At beginning.	At end.		Calori-meter.	W+b.	W.	W+b+w.	w.	$t_f$ .	$t_s$ .	%	
			<i>b.</i>									
1	10.10	10.19	174.7	96.3	420.3	330	438.4	18.1	105	46	94.38	335
2	11.38	11.49	174.7	91	410.3	328.3	140.4	21.1	115.5	49	90.82	335
3	1.05	1.15	171.7	90.7	419.6	328.9	411.5	21.9	118	50	89.52	340
4	2.39	2.50	171.7	90.6	419.3	328.7	441.6	22.3	116.5	46.5	90.63	345
Mean values of Q and temperatures.											91.34	337.5

Percentage of moisture in the steam, 100 (1-Q) ..... 8.66

From the foregoing tables the following data are obtained, from which the computations for the potential evaporation are made:

Average steam pressure absolute, $p$ .....	174.7
Average temperature of the feed water, $t_1$ .....	45.3
(a) Number of pounds of water vaporized, $W_1 \times Q$ .....	8,129.5
(b) Number of pounds of water carried over with the steam, $W_1 (1-Q)$ .....	770.5
Total heat of steam at pressure $p$ from $32^\circ$ .....	1,194.94
Total heat of water at temperature $t_1$ from $32^\circ$ .....	13.38
(c) Units of heat required to vaporize 1 pound of water from a temperature $t_1$ and under a pressure $p$ .....	1,181.56
(c') Units of heat required to raise the temperature of 1 pound of water from $t_1$ to the temperature due to the pressure $p$ .....	329.47
(d) Units of heat required to vaporize 1 pound of water from and at a temperature of $212^\circ$ and under atmospheric pressure .....	965.8
Total heat required to vaporize the water, $a \times c$ .....	9,605,800
Total heat required to raise the temperature of the water, $b \times c'$ .....	253,850
(e) Total heat obtained from the fuel as measured by the steam discharged .....	9,859,650
(f) Units of heat obtained per pound of fuel .....	7,048
(g) Units of heat obtained per pound of combustible .....	7,888
$f$ Potential evaporation per pound of fuel from a temperature $t_1$ and under a pressure $p$ .....	5.96
$g$ Potential evaporation per pound of combustible from a temperature $t_1$ and under a pressure $p$ .....	6.68
$f$ Equivalent potential evaporation per pound of fuel from and at a temperature of $212^\circ$ and under atmospheric pressure .....	7.30
$g$ Equivalent potential evaporation per pound of combustible from and at a temperature of $212^\circ$ and under atmospheric pressure .....	8.17

TABLE A3.—Recapitulation of the results of the evaporative and calorimetric tests.

[NOTE.—All weights are given in pounds and all temperatures in degrees Fahrenheit.]

#### TOTAL QUANTITIES.

Duration of test, in hours .....	6.25
Fuel (bituminous) consumed .....	1,399
Refuse from fuel, in dry ashes, dust, and clinkers .....	149
Combustible consumed .....	1,250
Water fed to boiler, by tank measurement, $W_1$ .....	8,900
Per cent of the fuel in dry refuse, etc. ....	10.65

#### AVERAGE QUANTITIES.

Temperature of feed water, $t_1$ .....	45.3
Temperature of steam, by thermometer .....	336.2
Temperature of uptake .....	above $608^\circ$
Temperature of atmosphere .....	51.1
Temperature of fire room .....	69.6
Barometer, in inches of mercury .....	29.96
Pressure of steam at boiler, in pounds per square inch above a perfect vacuum, $14.7 +$ pressure by gauge in pounds, $p$ .....	174.7

Rates of combustion.	Fuel.	Combustible.
	<i>Pounds.</i>	<i>Pounds.</i>
Amount consumed per hour .....	223.85	200.00
Amount consumed per hour per square foot of grate surface .....	14.35	12.82
Amount consumed per hour per square foot of heating surface (exterior) .....	.39	.35
Vaporization, in pounds of water.	Per pound of fuel.	Per pound of combustible.
Apparent evaporation, by tank measurement, from a temperature $t_1$ and under a pressure $p$ .....	6.36	7.12
Equivalent apparent evaporation from and at $212^\circ$ and under atmospheric pressure .....	7.78	8.71
Actual evaporation, into steam of quality $Q$ , from a temperature $t_1$ and under a pressure $p$ .....	5.82	6.51
Equivalent actual evaporation from and at $212^\circ$ and under atmospheric pressure .....	7.12	7.97
Potential evaporation, or evaporation had all the heat obtained from fuel been utilized in converting the water in boiler into dry saturated steam from a temperature $t_1$ and under a pressure $p$ .....	5.96	6.68
Equivalent potential evaporation from and at $212^\circ$ and under atmospheric pressure .....	7.30	8.17

TABLE B 1.—*Evaporative test of Towne boiler for ferry boat at Portsmouth, N. H., on the 24th of November, 1891.*

NATURAL DRAFT.—ANTHRACITE COAL.

Reference number.	Time.	Steam pressure, by gauge, at boilers.	Barometer (mercurial).	Fuel consumed.	Dry refuse.	Water fed to boilers.	Temperatures.				Velocity of air entering ash pit, in feet, per minute.	Cubic feet of air entering per minute.
							Feed water, $t_1$ .	Steam, by thermometer, at boilers.	In uptake.	Atmosphere.	Fireroom.	
			<i>Ins.</i>	<i>Lbs.</i>	<i>Lbs.</i>	<i>Lbs.</i>						
1	8.45	160	29.73	(450)450			44	335	510	48	58	
2	9.45	160	.72	365		1,101.4	44	337	550	50	64	287
3	10.45	160	.71	235		924.2	44	340	490	52	73	178
4	11.45	160	.69	200		1,060.4	45	340	480	52	76	150
5	12.45	160	.69	100		1,096.5	45	337	460	52	76	180
6	1.45	160	.71	75		1,025.3	45	342	475	53	72	160
7	2.45	160	.72		448	1,031.3	45	340	490	52	68	165
8	3.30	Trial ended.				652.8						
		160	29.71	1,475	448	6,892.0	44.6	338.7	493.5	51.3	69.6	186.7
												213.7

\* Wood reduced to equivalent in coal.

Lead melted in uptake; temperature above 608°.

Six bricks in uptake.

TABLE B 2.—*Calorimetric tests of Towne boiler of ferryboat at Portsmouth, N. H., on the 24th of November, 1892.*

Number of test.	Time.		Average pressure of steam in pounds absolute.	Weights.				Temperatures.				Q.	Temperature of steam by thermometer.
	At beginning.	At end.		Calorimeter, $b$ .	$W+b$ .	$W$ .	$W+b+u$ .	$t_1$ .	$t_2$ .	$t_3$ .	$t_4$ .	%.	
1	9:30	9:40	174.7	90.3	420	329.7	441.5	21.5	114	46		91.62	337.5
2	11:00	11:10	174.7	90.5	419.8	329.3	440.3	20.5	115.5	50		92.86	335
3	12:30	12:40	174.7	90.4	419.3	328.9	438.8	19.5	114.3	50.7		95.14	335
4	2:02	2:13	174.7	90.4	420	329.6	443.2	23.2	118.6	48.2		87.15	342
Mean values of Q and temperature.												91.69	337.4

Percentage of moisture in the steam, 100 (1-Q)..... 8.31

From the foregoing tables the following data are obtained, from which the computations for the potential evaporation are made:

Average steam pressure, absolute, $p$ .....	174.7
Average temperature of the feed water, $t_1$ .....	44.6
(a) Number of pounds of water vaporized, $W_1 \times Q$ .....	6,319.3
(b) Number of pounds of water carried over with the steam, $W_1 (1-Q)$ .....	572.7
Total heat of steam at pressure $p$ .....	1,194.94
Total heat of water at temperature $t_1$ .....	12.68
(c) Units of heat required to vaporize 1 pound of water from a temperature $t_1$ , and under a pressure $p$ .....	1,182.26
(d) Units of heat required to raise the temperature of 1 pound of water from $t_1$ to the temperature due to the pressure $p$ .....	330.17
(e) Units of heat required to vaporize 1 pound of water from and at a temperature of 212°, and under atmospheric pressure.....	965.8
Total heat required to vaporize the water, $a \times c$ .....	7,471,100
Total heat required to raise the temperature of the water, $b \times d$ .....	189,000
(f) Total heat obtained from the fuel, as measured by the steam discharged.....	7,660,100
(g) Units of heat obtained per pound of fuel.....	5,192.8
(h) Units of heat obtained per pound of combustible.....	7,458.5
(i) Potential evaporation per pound of fuel, from a temperature $t_1$ , and under a pressure $p$ .....	4.39
(j) Potential evaporation per pound of combustible, from a temperature $t_1$ , and under pressure $p$ .....	6.31
(k) Equivalent potential evaporation per pound of fuel from and at a temperature of 212°, and under atmospheric pressure.....	5.38
(l) Equivalent potential evaporation per pound of combustible from and at a temperature of 212°, and under atmospheric pressure.....	7.73

TABLE B<sub>3</sub>.—Recapitulation of the results of the evaporative and calorimetric tests.

[NOTE.—All weights are given in pounds and all temperatures in degrees Fahrenheit.]

## TOTAL QUANTITIES.

Duration of test, in hours.....	6.75
Fuel (anthracite) consumed.....	1,475
Refuse from fuel, in dry ashes, dust, and clinkers.....	448
Combustible consumed.....	1,027
Water fed to boiler, by tank measurement, $W_1$ .....	6,892
Per cent of the fuel in dry refuse, etc.....	30.37

## AVERAGE QUANTITIES.

Temperature of feed water, $t_1$ .....	44.6
Temperature of steam, by thermometer.....	338.7
Temperature of uptake.....	above 608
Temperature of atmosphere.....	51.3
Temperature of fire room.....	69.6
Barometer, in inches of mercury.....	29.71
Pressure of steam at boiler, in pounds per square inch above a perfect vacuum, $14.7 + \text{pressure by gauge in pounds, } p$ .....	174.7

Rates of combustion.	Fuel.	Combustible.
	<i>Pounds.</i>	<i>Pounds.</i>
Amount consumed per hour.....	218.52	152.15
Amount consumed per hour per square foot of grate surface.....	14.01	9.75
Amount consumed per hour per square foot of heating surface (exterior)....	0.38	0.27

Vaporization in pounds of water.	Per pound of fuel.	Per pound of combustible.
Apparent evaporation, by tank measurement, from a temperature $t_1$ and under a pressure $p$ .....	4.67	6.71
Equivalent apparent evaporation from and at 212° and under atmospheric pressure.....	5.78	8.30
Actual evaporation, into steam of quality $Q$ , from a temperature $t_1$ and under a pressure $P$ .....	4.28	6.15
Equivalent actual evaporation from and at 212° and under atmospheric pressure.....	5.29	7.00
Potential evaporation, or evaporation had all the heat obtained from fuel been utilized in converting the water in boiler into dry saturated steam from a temperature $t_1$ and under a pressure $p$ .....	4.39	6.31
Equivalent potential evaporation from and at 212° and under atmospheric pressure.....	5.38	7.72

TABLE C 1.—Evaporative test of Towne boiler for ferry boat at Portsmouth, N. H., on the 1st of December, 1891.

## STEAM JET.—ANTHRACITE COAL.

Reference number.	Time.	Steam pressure by gauge at boilers.	Barometer, mercurial.	Fuel consumed.	Dry refuse.	Water fed to boilers.	Temperatures.				Velocity of air entering ash pit in feet per minute.	Cubic feet of air entering per minute.
							Feed water $t_1$ .	Steam by thermometer at boilers.	In uptake.	Atmosphere.	Fire room.	
			<i>Inch.</i>	<i>Lbs.</i>	<i>Lbs.</i>	<i>Lbs.</i>						
1	9:05	160	30.53	(*50) 675	.....	35	344	560	32	52	.....	.....
2	10:05	160	53	435	.....	1,706.3	355	720	36	62	700	805
3	11:05	160	49	390	.....	2,024.7	352	680	38	72	650	747
4	12:05	160	47	450	.....	2,316.1	350	730	40	69	640	736
5	1:05	160	43	525	.....	2,701.5	352	650	40	69	660	758
6	2:05	160	42	30	.....	2,132.8	350	650	42	70	600	690
7	3:05	160	43	.....	428	1,051.6	348	500	43	64	650	747
.....		160	30.47	2,555	428	12,860.0	38.3	350.9	641.4	38.7	65.4	747.2

\* Wood reduced to equivalent in coal. † Trial ended.

Zinc melted in uptake; temperature above 680°.

Six bricks in uptake.

TABLE C 2—Calorimetric tests on the 1st of December, 1891.

Number of test.	Time.		Average pressure of steam in pounds absolute.	Weights.					Temperatures.		Q. %.	Temperature of steam by thermometer.	
	At beginning.	At end.		Calorimeter. <i>b</i> .	<i>W + b</i> .	<i>W</i> .	<i>W + b + w</i> .	<i>w</i> .	<i>t'</i> .	<i>t</i> .			
1	9:45	9:56	174.7	89.7	420.1	330.4	442.7	22.6	108.7	39.0	88.27	355.0	
2	11:15	11:25	174.7	89.7	420.0	330.3	440.7	20.7	109.0	43.7	90.94	354.0	
3	12:45	12:55	174.7	89.8	419.7	329.9	440.5	20.8	110.6	45.3	90.40	353.0	
4	2:15	2:25	174.7	89.9	420.0	330.1	440.5	20.5	109.7	44.5	91.96	352.0	
Mean values of Q and temperature .....												90.39	353.5

Percentage moisture in the steam, 100 (1-Q) ..... 9.61

From the foregoing tables the following data are obtained, from which the computations for the potential evaporation are made:

Average steam pressure, absolute, <i>p</i> .....	174.7
Average temperature of the feed water, <i>t<sub>f</sub></i> .....	38.3
(a) Number of pounds of water vaporized, $W_1 \times Q$ .....	11,629.6
(b) Number of pounds of water carried over with the steam, $W_1 (1-Q)$ .....	1,236.4
Total heat of steam at pressure <i>p</i> from 32° .....	1,194.94
Total heat of water at temperature <i>t<sub>f</sub></i> from 32° .....	6.84
(c) Units of heat required to vaporize 1 pound of water from a temperature <i>t<sub>f</sub></i> and under a pressure <i>p</i> .....	1,188.60
(e) Units of heat required to raise the temperature of 1 pound of water from <i>t<sub>f</sub></i> to the temperature due to the pressure <i>p</i> .....	386.51
(d) Units of heat required to vaporize 1 pound of water from and at a temperature of 212° and under atmospheric pressure .....	965.8
Total heat required to vaporize the water, $a \times c$ .....	13,823,000
Total heat required to raise the temperature of the water, $b \times c$ .....	416,060
(c) Total heat obtained from the fuel, as measured by the steam discharged .....	14,239,060
(f) Units of heat obtained per pound of fuel .....	5,572.2
(g) Units of heat obtained per pound of combustible .....	6,694.0
<i>f</i> Potential evaporation per pound of fuel, from a temperature <i>t<sub>f</sub></i> and under a pressure <i>p</i> ..	4.69
<i>g</i> Potential evaporation per pound of combustible, from a temperature <i>t<sub>f</sub></i> and under a pressure <i>p</i> .....	5.63
<i>f</i> Equivalent potential evaporation per pound of fuel, from and at a temperature of 212° ..	5.77
<i>d</i> and under atmospheric pressure .....	5.77
<i>g</i> Equivalent potential evaporation per pound of combustible from and at a temperature of 212° ..	6.93
<i>d</i> and under atmospheric pressure .....	6.93

TABLE C 3.—Recapitulation of the results of the evaporative and calorimetric tests.

[NOTE.—All weights are given in pounds and all temperatures in degrees F.]

## TOTAL QUANTITIES.

Duration of test, in hours .....	6
Fuel (anthracite) consumed .....	2,555
Refuse from fuel, in dry ashes, dust, and clinkers .....	428
Combustible consumed .....	2,127
Water fed to boiler, by tank measurement, $W_1$ .....	12,866
Per cent of the fuel in dry refuse, etc. ....	16.75

## AVERAGE QUANTITIES.

Temperature of feed water, <i>t<sub>f</sub></i> .....	38.3
Temperature of steam, by thermometer .....	350.9
Temperature of uptake .....	680
Temperature of atmosphere .....	38.7
Temperature of fire-room .....	65.4
Barometer, in inches of mercury .....	30.47
Pressure of steam at boiler, in pounds per square inch, above a perfect vacuum, 14.7+ pressure by gauge, in pounds, <i>p</i> .....	174.7



Rates of combustion.		Fuel.	Combustible.
		Pounds.	Pounds.
Amount consumed per hour.....		425.53	854.5
Amount consumed per hour per square foot of grate surface.....		57.20	22.73
Amount consumed per hour per square foot of heating surface (exterior)...		.74	.61

Vaporization in pounds of water.	Per pound of fuel.	Per pound of combustible.
Apparent evaporation, by tank measurement, from a temperature <i>t</i> , and under a pressure <i>p</i> .....	5.04	6.05
Equivalent apparent evaporation from and at 212° and under atmospheric pressure.....	6.20	7.45
Actual evaporation, into steam of quality <i>Q</i> , from a temperature <i>t</i> , and under a pressure <i>p</i> .....	4.55	5.47
Equivalent actual evaporation from and at 212° and under atmospheric pressure.....	5.50	6.73
Potential evaporation, or evaporation had all the heat obtained from fuel been utilized in converting the water in boiler into dry saturated steam from a temperature <i>t</i> , and under a pressure <i>p</i> .....	4.60	5.63
Equivalent potential evaporation from and at 212° and under atmospheric pressure.....	5.77	6.93

TABLE D 1.—*Evaporative test of Towne boiler for ferry boat, at Portsmouth, N. H., on the 2d of December, 1891.*

## ONE INCH AIR PRESSURE—ANTHRACITE COAL.

Reference number.	Time.	Steam pressure by gauge, at boilers.	Barometer, mercurial.	Fuel consumed.	Dry refuse.	Water fed to boilers.	Temperatures.					Air pressure in inches of water.	Revolutions of blowing engines.	Velocity of air entering ash pit, in feet per minute.	Cubic feet of air entering per minute.
							Feed-water, <i>t</i> .	Steam by thermometer at boilers.	In uptake.	Atmosphere.	Fire-room.				
			Inch.	Lbs.	Lbs.	Lbs.									
1	8:55	160	30.37	(50) 880			36	335	580	34	52				
2	9:55	160	.37	320		1564.1	38	349	800	38	68	1	250	1,090	1,690
3	10:55	160	.31	440		2060.8	39	350	800	44	75	1	250	870	1,349
4	11:55	160	.24	460		2026.7	39	350	900	48	70	1	260	1,000	1,550
5	12:55	160	.23	450		2416.2	39	350	900	50	74	1	270	1,020	1,580
6	1:55	160	.18	200		2417.3	40	345	950	52	73	1	280	1,211	1,877
7	2:55	160	.18		580	2202.9	40	345	900	54	72	1	290	1,400	2,170
9	.....	160	30.23	2,800	580	12,688	38.7	348	832.9	45.7	69.4	1	257.1	1,098.5	1,702.7

\* Wood reduced to equivalent in coal. † Trial ended.

Started blower at 9:15; had 1 inch air pressure at 9:25.

Zinc melted in uptake; temperature above 680°.

Six bricks in uptake.

TABLE D 2.—*Calorimetric tests on the 2d of December, 1891.*

No. of test.	Time.		Average pressure of steam, absolute. P.	Calorimeter. b.	Weights.				Temperatures.		Q. %	Temperature of steam by thermometer.	
	At beginning.	At end.			W + b.	W.	W + b + w.	w.	t'.	t.			
			<i>Pounds.</i>										
1	9:41	9:51	174.7	89.8	420	330.2	440.1	20.1	105.6	41.6	91.87	351	
2	11:11	11:21	174.7	89.8	420	330.2	440.5	20.5	108.3	44.3	89.54	350	
3	12:33	12:43	174.7	89.8	420	330.2	440.9	20.9	110.7	45.7	89.36	350	
4	2:10	2:20	174.7	89.8	420	330.2	440.9	20.0	107.8	44.8	90.57	345	
Mean values of Q and temperature.....												90.34	349

Percentage of moisture in the steam, 100 (1-Q).....

2.66

From the foregoing tables the following data are obtained, from which the computations for the potential evaporations are made:

Average steam pressure, absolute, $p$ .....	174.7
Average temperature of the feed-water, $t_1$ .....	38.7
(a) Number of pounds of water vaporized, $W_1 \times Q$ .....	11,462.3
(b) Number of pounds of water carried over with the steam, $W_1 (1-Q)$ .....	1,225.7
Total heat of steam at pressure $p$ .....	1,194.94
Total heat of water at temperature $t_1$ .....	6.74
(c) Units of heat required to vaporize one pound of water from a temperature $t_1$ and under a pressure $p$ .....	1,188.20
(c') Units of heat required to raise the temperature of one pound of water from $t_1$ to the temperature due to the pressure $p$ .....	336.11
(d) Units of heat required to vaporize one pound of water from and at a temperature of 212° and under atmospheric pressure .....	965.8
Total heat required to vaporize the water, $a \times c$ .....	13,618,000
Total heat required to raise the temperature of the water, $b \times c'$ .....	411,970
(e) Total heat obtained from the fuel, as measured by the steam discharged .....	14,029,970
(f) Units of heat obtained per pound of fuel .....	5,010.5
(g) Units of heat obtained per pound of combustible .....	6,319.5
$\frac{f}{e}$ Potential evaporation per pound of fuel, from a temperature $t_1$ and under a pressure $p$ .....	4.22
$\frac{g}{e}$ Potential evaporation per pound of combustible, from a temperature $t_1$ and under a pressure $p$ .....	5.32
$\frac{f}{d}$ Equivalent potential evaporation per pound of fuel, from and at a temperature of 212° and under atmospheric pressure .....	5.19
$\frac{g}{d}$ Equivalent potential evaporation per pound of combustible from and at a temperature of 212° and under atmospheric pressure .....	6.54

TABLE D 3.—Recapitulation of the results of the evaporative and calorimetric tests.

[NOTE.—All weights are given in pounds and all temperatures in degrees Fahrenheit.]

#### TOTAL QUANTITIES.

Duration of test, in hours .....	6.17
Fuel (anthracite) consumed .....	2,800
Refuse from fuel, in dry ashes, dust, and clinkers .....	580
Combustible consumed .....	2,220
Water fed to boiler, by tank measurement, $W_1$ .....	12,688
Per cent of the fuel in dry refuse, etc. ....	20.71

#### AVERAGE QUANTITIES.

Temperature of feed water $t_1$ .....	38.7
Temperature of steam, by thermometer .....	348.0
Temperature of uptake .....	above..
Temperature of atmosphere .....	680
Temperature of fire room .....	45.7
Barometer, in inches of mercury .....	29.4
Pressure of steam at boiler, in pounds per square inch above a perfect vacuum, 14.7+ pressure by gauge in pounds $p$ .....	30.23
Air pressure, in inches of water, at ash pit .....	174.7
Revolutions of blowing engines, per minute .....	1
	257.1

Rates of combustion.	Fuel.	Combustible.
	Pounds.	Pounds.
Amount consumed per hour .....	453.8	359.8
Amount consumed per hour per square foot of grate surface .....	29.09	23.07
Amount consumed per hour per square foot of heating surface (exterior) .....	0.79	0.62
Vaporization in pounds of water.	Per pound of fuel.	Per pound of combustible.
Apparent evaporation, by tank measurement, from a temperature $t_1$ and under a pressure $p$ .....	4.53	5.71
Equivalent apparent evaporation from and at 212° and under atmospheric pressure .....	5.57	7.04
Actual evaporation into steam of quality $Q$ , from a temperature $t_1$ and under a pressure $p$ .....	4.09	5.17
Equivalent actual evaporation from and at 212° and under atmospheric pressure .....	5.03	6.36
Potential evaporation or evaporation had all the heat obtained from fuel been utilized in converting the water in boiler into dry saturated steam from a temperature $t_1$ and under a pressure $p$ .....	4.22	5.32
Equivalent potential evaporation from and at 212° and under atmospheric pressure .....	5.19	6.54

TABLE E 1.—*Evaporative test of Towne boiler for ferry boat, at Portsmouth, N. H., on the 3d of December, 1891.*

TWO INCHES AIR PRESSURE—ANTHRACITE COAL.

Reference number.	Time.	Steam pressure by gauge at boilers.	Barometer, mercurial.	Fuel consumed.	Dry refuse.	Water fed to boilers.	Temperatures.						Revolutions of blowing engines.	Velocity of air entering ash-pit in feet per minute.	Cubic feet of air entering per minute.
							Feed water $t_1$ .	Steam by thermometer at boilers.	In uptake.	Atmosphere.	Fire room.	Air pressure in inches of water.			
1	8.35	160	Ina.	Lbs.	Lbs.	Lbs.	39	340	460	44	59				
2	9.35	160	30.48	(50) 900	665	2,024.6	39	360	900	46	74	2	400	1,848	2,864
3	10.35	160	30.48	535	535	2,345.0	40	360	880	49	77	2	400	1,750	2,712
4	11.35	160	30.45	525	525	2,690.5	40	360	1,050	52	83	2	400	1,530	2,262
5	12.35	160	30.45	345	345	2,807.7	40	360	1,120	52	79	2	400	1,930	2,996
6	1.35	160	30.46		662	2,132.8	40	355	800	52	72	1.5	300	2,283	2,539
		160	30.47	3,020	662	12,009.6	39.7	355.8	868.3	49.2	74	1.9	380	1,868.2	2,874.6

\* Wood reduced to equivalent in coal.

Started blower at 8.45; had 2 inches air pressure at 9.

At 1 p. m. several grate bars came down, and the blower was slowed. Trial ended at 1.35.

Antimony melted in uptake; temperature above  $810^{\circ}$ . Eight bricks in uptake.TABLE E 2.—*Calorimetric tests on the 3d of December, 1891.*

No. of test.	Time.		Average pressure of steam in pounds absolute. $P$ .	Weights.					Temperatures.		Q.	Temperature of steam by thermometer.
	At beginning.	At end.		Calorimeter. $b$ .	$W+b$ .	$W$ .	$W+b+w$ .	$w$ .	$t'$ .	$t$ .	%	
1	9.15	9.25	174.7	89.7	420	330.3	440.1	20.1	105.2	42.3	89.54	365
2	10.45	10.55	174.7	89.8	420	330.2	440.8	20.8	109.4	44.7	89.25	360
3	12.15	12.25	174.7	89.8	420	330.2	439.8	19.8	107.0	44.7	90.31	360
Mean value of Q and temperature.....											89.70	361.7

Percentage of moisture in the steam,  $100(1-Q)$ ..... 10.30

From the foregoing tables the following data are obtained, from which the computations for the potential evaporation are made:

Average steam pressure, absolute, $p$ .....	174.7
Average temperature of the feed water, $t_1$ .....	39.7
(a) Number of pounds of water vaporized, $W_1 \times Q$ .....	9,772.6
(b) Number of pounds of water carried over with the steam, $W_1(1-Q)$ .....	1,237.0
Total heat of steam at pressure $p$ .....	1,194.94
Total heat of water at temperature $t_1$ .....	7.75
(c) Units of heat required to vaporize 1 pound of water from a temperature $t_1$ and under a pressure $p$ .....	1,187.19
(c') Units of heat required to raise the temperature of 1 pound of water from $t_1$ to the temperature due to the pressure $p$ .....	335.10
(d) Units of heat required to vaporize 1 pound of water from and at a temperature of $212^{\circ}$ and under atmospheric pressure.....	965.8
Total heat required to vaporize the water, $a \times c$ .....	11,602,000
Total heat required to raise the temperature of the water, $b \times c'$ .....	414,500
e) Total heat obtained from the fuel, as measured by the steam discharged.....	12,016,500

<i>f</i> ) Units of heat obtained per pound of fuel .....	3,979.0
<i>g</i> ) Units of heat obtained per pound of combustible.....	5,096.3
<i>c</i> Potential evaporation per pound of fuel, from a temperature $t_1$ and under a pressure $p$ ..	2.85
<i>g</i> Potential evaporation per pound of combustible, from a temperature $t_1$ and under a pressure $p$ .....	4.30
<i>f</i> Equivalent potential evaporation per pound of fuel, from and at a temperature of $212^\circ$ and under atmospheric pressure.....	4.12
<i>g</i> Equivalent potential evaporation per pound of combustible from and at a temperature of $212^\circ$ and under atmospheric pressure.....	5.28

TABLE E 3.—Recapitulation of the results of the evaporative and calorimetric tests.

[NOTE.—All weights are given in pounds and all temperatures in degrees Fahrenheit.]

## TOTAL QUANTITIES.

Duration of test, in hours.....	5
Fuel (anthracite) consumed.....	3,020
Refuse from fuel, in dry ashes, dust, and clinkers .....	662
Combustible consumed.....	2,358
Water fed to boiler, by tank measurement, $W_1$ .....	12,009.6
Per cent of the fuel in dry refuse, etc.....	21.92

## AVERAGE QUANTITIES.

Temperature of feed water, $t_1$ .....	89.7
Temperature of steam, by thermometer.....	355.8
Temperature of uptake .....	above $810^\circ$
Temperature of atmosphere.....	49.2
Temperature of fire room .....	74
Barometer, in inches of mercury.....	30.47
Pressure of steam at boiler, in pounds per square inch above a perfect vacuum, $14.7 +$ pressure by gauge in pounds, $p$ .....	174.7
Air pressure, in inches of water, at ash pit .....	1.9
Revolutions of blowing engine, per minute .....	880

Rates of combustion.	Fuel.	Combustible.
	Pounds.	Pounds.
Amount consumed per hour .....	604	471.6
Amount consumed per hour per square foot of grate surface.....	38.72	80.23
Amount consumed per hour per square foot of heating surface (exterior)...	1.05	0.82
Vaporization in pounds of water.	Per pound of fuel.	Per pound of combustible.
Apparent evaporation, by tank measurement, from a temperature $t_1$ and under a pressure $p$ .....	3.98	5.10
Equivalent apparent evaporation from and at $212^\circ$ and under atmospheric pressure .....	4.89	6.26
Actual evaporation, into steam of quality $Q$ , from a temperature $t_1$ and under a pressure $p$ .....	3.57	4.57
Equivalent actual evaporation from and at $212^\circ$ and under atmospheric pressure.....	4.39	5.62
Potential evaporation or evaporation had all the heat obtained from fuel been utilized in converting the water in boiler into dry saturated steam from a temperature $t_1$ and under a pressure $p$ .....	3.35	4.30
Equivalent potential evaporation from and at $212^\circ$ and under atmospheric pressure .....	4.12	5.28

TABLE F 1.—*Evaporative test of Towne boiler for ferry boat at Portsmouth, N. H., on the 4th of December, 1891.*

TWO INCHES AIR PRESSURE.—BITUMINOUS COAL.

Reference number.	Time.	Steam pressure by gauge at boilers.	Barometer, mercurial.	Fuel consumed.	Dry refuse.	Water fed to boilers.	Temperature, Fahr.					Air pressure in inches of water.	Revolutions of blowing engines.	Velocity of air entering ash pit in feet per minute.	Cubic feet of air entering per minute.
							Feed water.	Steam by thermometer at boilers.	In uptake.	Atmosphere.	Fire room.				
			<i>Ins.</i>	<i>Lbs.</i>	<i>Lbs.</i>	<i>Lbs.</i>						<i>Ins.</i>			
1	8.30	160	30.55	(50) 635	.....	.....	39	335	590	48	61	.....	.....	.....	.....
2	9.30	160	.51	545	.....	2,096.8	40	350	600	49	75	2.0	450	2,840	4,402
3	10.30	160	.47	600	.....	2,630.4	40	350	560	52	76	2.0	440	2,500	3,875
4	11.30	160	.43	600	.....	3,092.0	40	351	800	52	76	2.0	440	2,600	4,030
5	12.30	160	.39	450	.....	3,020.9	40	350	850	52	75	2.0	440	2,500	3,875
6	1.30	160	.34	525	.....	2,049.8	40	350	900	52	75	2.0	440	2,300	3,565
7	2.30	160	.29	.....	302	3,305.3	40	345	850	52	77	2.0	440	2,600	4,030
8	3.00	Trial ended		.....	.....	1,067.4	40	.....	.....	.....	.....	.....	.....	.....	.....
		160	30.43	3,425	302	18,162.6	39.9	347.6	735.7	51	73.6	2.0	441.4	2,556.7	3,962.8

\* Wood reduced to equivalent in coal.

Started blower at 8.45; had 2 inches air pressure at 9; slowed blower at 2.35.  
 Antimony melted in uptake; temperature above 810°; eight bricks in uptake.  
 Pyrometer was placed over front of furnace, where fire was carried thickest.  
 A considerable quantity of light ashes was blown out of smoke pipe.

TABLE F 2.—*Calorimetric tests on the 4th of December, 1891.*

Number of test.	Time.		Average pressure of steam in pounds absolute.  p.	Weights.					Temperatures.		Q.  %	Temperature of steam by thermometer.	
	At beginning.	At end.		Calorimeter.  b.	W+b.	W.	W+b+w.	w.	t°.	t.			
1	9.11	9.21	174.7	90.4	420	329.6	440.2	20.2	105.6	42.2	87.76	350	
2	10.47	10.57	174.7	90.2	420	329.8	440.4	20.4	109	44.8	90.47	352	
3	12.12	12.22	174.7	90.1	420	329.9	440.2	20.2	107.2	44.0	89.86	350	
4	1.47	1.57	174.7	90.2	420	329.8	440.3	20.3	107.6	44.0	89.75	347	
Mean values of Q and temperature.....												89.38	349.8

Percentage of moisture in the steam, 100 (1-Q)..... 10.62

From the foregoing tables the following data are obtained, from which the computations for the potential evaporation are made:

Average steam pressure, absolute, $p$ .....	174.7
Average temperature of the feed water, $t_1$ .....	39.9
(a) Number of pounds of water vaporized, $W_1 \times Q$ .....	16,233.6
(b) Number of pounds of water carried over with the steam, $W_1 (1-Q)$ .....	1,929.0
Total heat of steam at pressure $p$ .....	1,194.94
Total heat of water at temperature $t_1$ .....	7.96
(c) Units of heat required to vaporize one pound of water from a temperature $t_1$ and under a pressure $p$ .....	1,186.98
(c') Units of heat required to raise the temperature of one pound of water from $t_1$ to the temperature due to the pressure $p$ .....	334.89
(d) Units of heat required to vaporize one pound of water from and at a temperature of 212° and under atmospheric pressure.....	965.8

Total heat required to vaporize the water, $a \times c$ .....	19,269,000
Total heat required to raise the temperature of the water, $b \times c_1$ .....	646,000
(e) Total heat obtained from the fuel, as measured by the steam discharged .....	19,915,000
(f) Units of heat obtained per pound of fuel .....	5,814.7
(g) Units of heat obtained per pound of combustible .....	6,377.0
$\frac{f}{c}$ Potential evaporation per pound of fuel, from a temperature $t_1$ and under a pressure $p$ .....	4.90
$\frac{g}{c_1}$ Potential evaporation per pound of combustible, from a temperature $t_1$ and under a pressure $p$ .....	5.37
$\frac{f}{c}$ Equivalent potential evaporation per pound of fuel, from and at a temperature of $212^\circ$ and under atmospheric pressure .....	6.02
$\frac{g}{c_1}$ Equivalent potential evaporation per pound of combustible, from and at a temperature of $212^\circ$ and under atmospheric pressure .....	6.60

TABLE F 3.—Recapitulation of the results of the evaporative and calorimetric tests.

[NOTE.—All weights are given in pounds and all temperatures in degrees Fahrenheit.]

## TOTAL QUANTITIES.

Duration of test, in hours .....	6.50
Fuel (bituminous) consumed .....	3,425
Refuse from fuel, in dry ashes, dust, and clinkers .....	302
Combustible consumed .....	3,123
Water fed to boiler, by tank measurement, $W_1$ .....	18,162.6
Per cent of the fuel in dry refuse, etc. ....	8.82

## AVERAGE QUANTITIES.

Temperature of feed water, $t_1$ .....	39.
Temperature of steam, by thermometer .....	347.
Temperature of uptake .....	above $810^\circ$
Temperature of atmosphere .....	51
Temperature of fire room .....	73.6
Barometer, in inches of mercury .....	30.43
Pressure of steam at boiler, in pounds per square inch above a perfect vacuum, $14.7 +$ pressure by gauge in pounds, $p$ .....	174.7
Air pressure in inches of water at ash pit .....	2
Revolutions of blowing engines, per minute .....	441.4

Rates of combustion.	Fuel.	Combustible.
	Pounds.	Pounds.
Amount consumed per hour .....	526.92	480.47
Amount consumed per hour per square foot of grate surface .....	33.78	30.80
Amount consumed per hour per square foot of heating surface (exterior) .....	0.91	0.83
Vaporization in pounds of water.	Per pound of fuel.	Per pound of combustible.
Apparent evaporation, by tank measurement, from a temperature $t_1$ and under a pressure $p$ .....	5.30	5.81
Equivalent apparent evaporation from and at $212^\circ$ and under atmospheric pressure .....	6.51	7.14
Actual evaporation, into steam of quality $Q$ , from a temperature $t_1$ and under a pressure $p$ .....	4.74	5.20
Equivalent actual evaporation from and at $212^\circ$ and under atmospheric pressure .....	5.82	6.38
Potential evaporation, or evaporation had all the heat obtained from fuel been utilized in converting the water in boiler into dry saturated steam from a temperature $t_1$ and under a pressure $p$ .....	4.90	5.37
Equivalent potential evaporation from and at $212^\circ$ and under atmospheric pressure .....	6.02	6.60

## APPENDIX B.

*Tests of copper pipes to determine the influence upon the bursting pressure of banding them, and also to determine the effect of various thicknesses of material and temperatures of brazing upon the strength of the seam and of the material adjacent thereto.*

(Tests made at the navy-yard, New York, in 1891 and 1892, under the direction of Chief Engineer S. L. F. Ayers, U. S. Navy, by Assistant Engineer F. H. Conant, U. S. Navy.)

### INSTRUCTIONS.

NAVY DEPARTMENT, BUREAU OF STEAM ENGINEERING,  
Washington, June 25, 1891.

SIR: The Bureau desires to have a test made to determine if the strength of a copper pipe to resist internal pressure is increased by securing bands around it at intervals of its length. To have any value the test should be made with the pipe at the temperature due to the pressure of steam to be carried by it, and for this purpose the apparatus shown by the blue print sent herewith, issue No. 2439, file No. 3-S-24, has been devised.

The apparatus consists, essentially, of two pieces of copper pipe of 8 inches internal diameter, one banded and one plain, as shown, with flanges brazed and riveted to their ends, to which heads may be bolted.

It is the intention to fill these pipes with hot water and maintain it, as nearly as possible, at a temperature of 371° F., by passing steam at 160 pounds pressure per square inch through the coil in the interior of the pipe. To obtain steam at this pressure one of the steam cutter boilers now on hand in the yard may be fitted up for the purpose; one end of the coil is to be connected with the steam space of this boiler and the other with a steam trap, and there will be openings in the heads for a thermometer and for connection with pressure pump and gauge, as shown.

As it is desired not to lower the temperature of the pipe when increasing the pressure, water for this purpose should be taken from the upper part of the water space of the boiler, from which steam at 160 pounds pressure is being taken to pass through the coil, and be forced into the test pipe by a pump fitted for the purpose between the boiler and the pipe.

A thermometer to indicate temperature under pressure (metallic preferred) will be so fitted that the temperature of the water in the pipe can be noted at any moment; there will also be connection made with the pressure gauge, which gauge should indicate to at least 1,500 pounds per square inch.

The pipes are to be tested to destruction, and care must be taken that they are so placed that no person can be injured by their rupture. They can be placed out of doors, with the pump, boiler, and pressure gauge inside the building, and the steam and water pipes led through holes in a door or window shutter.

After the pressure is applied the pipes should be carefully observed at each increment of about 50 pounds. Distension can be noted by means of lead rings secured at regular intervals. On the banded pipe these rings should be placed midway between the bands and between the two end bands and the flanges, as well as on the bands; on the plain pipe the lead rings should be placed in corresponding parts of its length.

After a pressure of about 500 pounds has been attained no person should be allowed to approach near the pipe under test, but its behavior noted as well as possible through a peep-hole in the door or window shutter.

It is desired that photographs of the pipes be taken after rupture and forwarded to the Bureau, if this can be conveniently done.

The report of the test should contain remarks on the condition of the pipes, bands, keys, flanges, rivets, brazing, and also the position and a description of the rupture. In the banded pipe note whether it bulges to an appreciable extent between the bands, and, in short, note everything that will convey any sort of information regarding the behavior of the two pipes under test.

In making the experimental pipes good material of all kinds is to be used and the work very carefully done. For the internal coil anything that can be adapted for the purpose may be used. Material on hand will be utilized as far as possible to avoid making requisition for new, and no work will be done except that necessary to accomplish the object sought for. It is hoped that but one set of heads, coil, etc., will be required.

It is also desired that the test and report be made without unnecessary delay.

Very respectfully,

GEO. W. MELVILLE,  
*Engineer-in-Chief, U. S. Navy, Chief of Bureau.*

The COMMANDANT,  
*Navy-Yard, New York.*

NAVY DEPARTMENT, BUREAU OF STEAM ENGINEERING,  
*Washington, July 25, 1891.*

SIR: The Bureau forwards herewith, for use in the steam-engineering department of the yard under your command, blue print showing copper pipes which it desires made and tested in compliance with the following:

The pipes are to be of copper, 8 inches in internal diameter, of good material and fitted with flanges as shown in the print; the flanges by which the two pieces of pipe are connected will not be secured to the pipes in any other way than by expanding the ends of the pipes into the conical openings through the flanges, as shown.

No extraordinary care is to be taken in making the center joint, but the workmanship will be good and such as would be employed in the manufacture of first-class steam pipe. The coned flanges will be made of good cast iron; the heads and other flanges will be those used in the last pipe tests made at the yard.

The pipes will be first subjected to a cold-water pressure of 200 pounds per square inch, and the behavior of the joints carefully noted, special care being taken to discover leakage around the joint between the pipe and the inside bushing. If any leakage occurs, its position will be carefully noted, its distance from the line of brazing measured, and the point marked on the blue print, which will then be returned to the Bureau.

On the completion of the cold-water test the pipe will be subjected to a hot-water test in the manner prescribed in Bureau's letter 1873-LI, of the 25th June last, first with a pressure of 200 pounds per square inch, and the leaks, if any, noted as above. After this first test, the pipe will be tested to destruction, its behavior carefully noted, and a full report, as before directed, sent to the Bureau.

Please give the directions necessary to have the above carried out without unnecessary delay.

File No. of blue print 3-S-25, issue No. 2493.

Very respectfully,

W. H. H. SMITH,  
*Acting Chief of Bureau.*

The COMMANDANT,  
*Navy-Yard, New York.*

## REPORT.

### DESCRIPTION OF PIPES.

Pipe No. 1 was made of No. 4 (Stubbs gauge) sheet copper of fair quality, was of 8 inches internal diameter, and was 3 feet 1½ inches from face to face of flange. The longitudinal joint was made without clamps, was chamfered and lapped 1 inch, and brazed with spelter of fair quality. The flanges were of composition (80 parts copper, 20 parts zinc), and of the following dimensions: External diameter at face, 13 inches; internal diameter at face, 8½ inches; thickness, thirteen-sixteenths inch; width of boss, 1½ inches; internal diameter of boss, 8½ inches. The outside of the boss was made with a taper, the diameter diminishing towards the end three-fourths inch to 1 foot, and being at the rivet holes 9¼ inches. At the end of the boss was a small recess to receive the brazing metal, and at the face of the flange a similar recess to receive the end of the pipe, which was flanged out into it such a distance that its edge would be tangent to a continuation of the external surface of the boss. The flanges were brazed and riveted to the pipe with one-fourth-inch rivets pitched at 1 inch. The pipe was not planished.



Pipe No. 2 was like No. 1 except that it was reinforced by three 2 by  $\frac{1}{4}$  inch wrought-iron bands placed at equal intervals between the flanges. The bands were drawn tight by a tapered key working through slotted lugs, which dovetailed together at the ends. The distension bands, referred to later, were placed on this pipe, at equal intervals between the iron bands and flange bosses.

Pipe No. 3 was like No. 1 except that it was made in two sections with a joint in the middle. The joint was made in the following manner:

The end of each section, for a distance of 1 $\frac{1}{2}$  inches, was expanded by hammering on a tapered former, the taper of which was  $\frac{1}{8}$  to 1 inch. An annular composition ring, of 7 $\frac{1}{2}$  inches internal diameter and 3 $\frac{1}{2}$  inches wide, with the outside tapered both ways from the middle  $\frac{1}{8}$  to 1 inch, was made to fit into the expanded ends of the sections so that the edges of the ring came to the bottom of the taper in the pipe. Before expanding the end, a cast-iron flange 1 inch thick, with a boss one-half inch wide, and bored to the same taper, with a least internal diameter equal to the external diameter of the pipe, had been slipped over it with the boss pointing outward.

The annular ring being in position, the flanges were drawn together by means of twelve three-fourths inch bolts, thus squeezing the copper to a bearing between the flanges and ring. Both sections were planished after the other work had been completed.

Pipe No. 4 was made of No. 3 (Stubbs gauge) copper and was like pipe 3 except that the joint was made by turning out the end of the sections 2 $\frac{1}{2}$  inches to form a flange. The flange was supported by a cast-iron ring of the same width and 1 inch thick, made in halves for convenience in putting on the pipe, the securing bolts passing through both the rings and flanges. The other flange of the inner section was made of stiff bronze (54 parts copper, 44 parts zinc, and 2 parts iron), and, instead of being brazed and riveted, was sweated and riveted on the pipe with a solder composed of 1 part copper, 2 parts lead, and 2 parts tin, the melting point of which was found to be 550° F. The longitudinal brazed seam of the inner section was made with two clamps, instead of being straight, as in the other pipes.

#### ARRANGEMENT FOR TESTING.

The pipe was closed with composition heads, 1 $\frac{1}{2}$  inches thick, and ribbed on the outside. A coil of 1-inch wrought-iron pipe, for live steam, ran through the pipe, and came out through stuffing boxes in the heads, one end leading to the steam drum of the boiler and the other to a steam trap. In the inner head, there were also connections to the pump and pressure gauge; and, in the outer head, two openings for thermometers, a mercurial and a metallic thermometer being used to indicate the temperature of the water in the pipe. Graduated lead bands wound twice around the pipes, the ends being drawn together by a spring, were placed at equal intervals to show the circumferential distension. These bands are designated in the tables as A, B, C and D, being lettered consecutively from the inner end of the pipe.

The pipe was set up outside of a bulkhead, inside of which were the boiler, pump and pressure gauge. Properly placed peep-holes permitted observations from the inside when the pressure had attained a dangerous degree. A Knowles hydraulic pump, with a piston ratio of sixteen to one, was employed in applying the pressure, the suction being connected with the base ring of a Ward tubular boiler, and the discharge leading directly into the pipe. The boiler also supplied steam for driving the pump, and for the heating coil inside the pipe.

#### METHOD OF TESTING.

Water from the boiler was allowed to flow through the pump to the pipe; and, at the same time, live steam was passed through the coil, until a temperature of 350° F. the maximum that could be maintained, was reached, when the pressure was applied, and distension being noted, if possible, for each increment of 50 pounds until the pipe gave way.

#### DESCRIPTION OF TESTS.

Pipe No. 1 burst at a pressure of 835 pounds per square inch. The first distension noted occurred at 450 pounds, and increased as shown in the table below. The rivets commenced leaking at 400 pounds, and the head joints at 800 pounds. The rupture occurred along the brazed joint, at the edge of the overlap between bands A and B. The opening was 5 $\frac{1}{4}$  inches long by one-half inch wide, at the center, from which it tapered both ways to the ends. The fracture was square and granular, and was discolored for about one-half of its width from the outside showing that the pipe had cracked part of the way through at this point before it gave way.

*Circumferential distension (in inches).*

Pressures per square inch.	400	450	500	550	600	650	700	750	800	835
Bands:										
A.....	0	.1	.2	.3	.4	.4	.4	.5	.5	.6
B.....	0	0	0	0	0	0	0	0	0	0
C.....	0	0	0	0	0	0	0	0	0	0
D.....	0	.1	.2	.3	.4	.4	.5	.6	.7	.8

Pipe No. 2 burst at 785 pounds per square inch. The first distension noted occurred at 450 pounds, and increased as shown in the table below. The rivets commenced leaking at 425 pounds, and the head joints were tight throughout.

The rupture occurred along the brazed joint at the edge of the overlap between the first lead and first iron band.

The opening was 3 inches long by three-eighths of an inch wide at its broadest part. The fracture was square and granular, and was discolored for about one-half its width from the outside.

*Circumferential distension (in inches).*

Pressures per square inch.....	400	450	500	550	600	650	700	750	785
Bands:									
A.....	.0	.1	.1	.2	.2	.3	.3	.4	.4
B.....	.0	.0	.0	.0	.0	.0	.0	.0	.0
C.....	.0	.0	.0	.0	.0	.0	.0	.0	.0
D.....	.0	.0	.1	.1	.1	.2	.2	.3	.3

Pipe No. 3 was first tested with a cold-water pressure of 200 pounds per square inch, when it was found that, despite all attempts to make it tight, the middle joint leaked in the vicinity of the brazed joints.

At the same pressure, but with the water at a temperature of 350° F., the leakage occurred at the same points, and was, as nearly as could be determined, about the same in quantity.

At 800 pounds per square inch the pressure on the heads forced the sections apart, the pipes pulling out at the joint, the inner section one-half inch, and the outer section three-eighths inch. The drop in the pressure, due to the sudden increase in internal volume, prevented the sections being blown entirely apart. No distension could be detected. The rivets commenced leaking at 500 pounds, and the middle joint leaked at all pressures.

The sections were placed as before, and braced in a longitudinal direction by outside tie-rods. At 875 pounds the leakage at the middle joint was sufficient to prevent the attainment of any higher pressure. A cloud of vapor surrounding the pipe made it impossible to observe the distension while the pressure was being applied. The total distension, however, at this and at the other points where it was noted, is given in the table below. A large number of fine surface cracks, extending in a longitudinal direction, the largest of which was about one-half inch long, had made their appearance especially on the inner section. They were confined to an area 3 inches wide on each side of the brazed joint. A longitudinal crack, 1 inch long extending from the end through a rivet hole, had also developed itself in the boss of the inner flange.

The cone joint was abandoned; and in its place on the inner section a standard flange was sweated, with the solder before mentioned, and riveted; while, on the outer section, a flange was made by turning out the pipe itself to a width of 2½ inches, a loose flange, which was to serve as a stiffening ring, having been previously slipped over the end.

When the pipe was again tried, a pressure of 675 pounds developed a pin-hole leak in one of the cracks previously made in the inner section. It was in the brazed joint one-eighth inch from the edge of the overlap and 2 inches from the boss of the sweated flange. At 875 pounds, the hole had increased to a longitudinal crack three-sixteenths of an inch long, and the leakage at this point, at the rivets, and at the middle joint, became sufficient to prevent the attainment of any higher pressure.

Notwithstanding that this pressure was no higher than that which had been previously applied, an additional distension, particularly at band B, due to the anneal-

ing action of the heat, to which the pipe was exposed in sweating on the flange, was noted. The surface cracks had increased in number and size.

The outer section was removed and the inner section tried alone. At 925 pounds the crack had increased in length to one-half inch, and the resultant leakage again stopped the test. The surface cracks had again increased in size and number, and the largest one was  $1\frac{1}{4}$  inches long, one-sixteenth inch wide at the surface, and one-eighth inch deep.

A five-eighths-inch hole was drilled through the pipe at the crack when it was found that the brazing was defective, the spelter having failed to fill out the joint at this point. The hole was plugged by a bolt with a nut, washer, and grommet, on each side, and the pipe again tried. It burst at 950 pounds. The rupture occurred between the bands, and made an irregular opening which followed the wake of the surface cracks previously developed. It was  $3\frac{1}{4}$  inches long, one-quarter inch wide at its broadest part, and was about 1 inch from, and slightly inclined to, the edge of the overlap.

The fracture was square and granular, and was discolored for about one-third of its width from the outside. The surface cracks had become very numerous, and many of them had extended half way through the sheet. They were all, however, confined to the area mentioned above.

The other section of pipe No. 3, designated in the tables as III', was then tried again. At 925 pounds the leakage due to the springing of the copper flange by the pressure on the heads caused the test to be interrupted.

The pipe was braced externally as before, and when again tried burst at a pressure of 950 pounds. The rupture occurred along the brazed joint at the edge of the overlap between the inner band and the boss of the loose flange. The opening was 3 inches long and one-eighth of an inch wide at the middle, its broadest part. The fracture was square and granular and was discolored for about two-thirds of its width from the outside. The surface cracks had increased in number and size, but were not so numerous or so large as those on the inner section. They were confined to the same locality.

*Circumferential distensions (in inches).*

Pressures per square inch.....	800	875	875 (2)	925	950
Bands:					
A .....	0	.7	.9	1.3	1.5
B .....	0	.6	1.2	1.7	2.0
C .....	0	.4	.5	.6	.7
D .....	0	.6	.6	.7	.7

**Pipe No. 4.** At a pressure of 825 pounds, the springing of the middle joint permitted sufficient leakage to prevent the attainment of any higher pressure. The rivets commenced leaking at 600 pounds and the middle joint at 675 pounds. The outside braces were put on and a pressure of 900 pounds reached when the leakage again became too great to permit the continuance of the test. At this point, no visible distension had occurred.

The outer section was removed, and the inner section tried alone, without the braces. At a pressure of 975 pounds, a longitudinal crack through a rivet hole, extending the whole width of the boss, made its appearance in the inner flange. At 1,060 pounds, a longitudinal surface crack, 1 inch long, developed itself just outside the brazed joint, near the outer flange. At 1,100 pounds, a crack,  $1\frac{1}{4}$  inches long, appeared along the brazed joint at the edge of the overlap near the middle of the pipe, and the brazed joint, near the inner clamp, appeared to be slipping. At 1,150 pounds, the springing of the copper flange necessitated putting on the braces. At 1,175 pounds, a large surface crack, 2 inches long, parallel to and 2 inches from the edge of the overlap between the outer band and the flange, developed itself. At this pressure, the first distension was noted.

At 1,225 pounds the pipe burst, ruptured in two places, mentioned above as showing signs of weakness. The larger opening was near the middle of the pipe, along the brazed joint at the edge of the overlap, until it arrived at the inner clamp, when it followed the underlap for five-eighths of an inch. The opening was  $4\frac{1}{2}$  inches long by five-sixteenths of an inch wide at the middle, its broadest part. The other opening was in the large longitudinal crack, 2 inches from the joint. It was 1 inch long and one-thirty-second of an inch wide. Both fractures were square and granular and discolored for about one-third of their width from the outside. The cast-iron backing ring had broken from time to time during the test, but was not renewed and at the finish was in eight pieces.

**Pipe III'.**—The test of the outer section, which is referred to in the tables as No. III', was then continued. At 1,000 pounds a pin-hole leak developed in the joint

of the sweated flange. At 1,070 pounds the springing of the copper flange made it necessary to put on the braces. At 1,175 pounds the repeated heating and straining to which the pipe had been subjected had resulted in sufficient leakage at the rivets and at the sweated joint to prevent the attainment of any higher pressure. The first distension noted had occurred at this point.

The pipe was taken down, the sweated joint was remade, and the rivets were hammered up. The pipe was not replanished. When it was again tried a pressure of 1,175 pounds caused considerable increased distension, especially near the sweated flange. At 1,275 pounds the pipe burst.

The rupture occurred under the inner band, through the underlap of the brazed joint, about one-fourth of an inch from the edge of the overlap, which pulled away and remained intact. The opening thus made was  $4\frac{1}{4}$  inches long by one-fourth of an inch wide at the middle. The fracture was square and granular for about 2 inches of its length near the middle, and inclined and fibrous at each end. There was no discoloration as in the other pipes.

*Circumferential distension.*

Pressures per square inch.....	950	1,175	1,175 (2)	1,225	1,275
Bands:					
A .....	0	.1	.....	.3	.....
B .....	0	.1	.....	.4	.....
C .....	0	.1	.2	.....	.4
D .....	0	.2	1.4	.....	2.0

A summary of the results of the pipe tests is given below in Table I.

TABLE I.

Number of pipes.	Dimensions in inches.			Flanges.			
	Diameter.	Length.	Thickness.	Material.	Method of securing.	Dimensions.	
						Thickness.	Width.
I	8	37 $\frac{1}{2}$	.240	Soft bronze ...	Brazed and riveted.....	$\frac{1}{8}$	2 $\frac{1}{2}$
				do .....	do .....	$\frac{1}{8}$	2 $\frac{1}{2}$
II	8	37 $\frac{1}{2}$	.240	Soft bronze ...	do .....	$\frac{1}{8}$	2 $\frac{1}{2}$
				do .....	do .....	$\frac{1}{8}$	2 $\frac{1}{2}$
III	8	18 $\frac{1}{2}$	.238	Soft bronze ...	do .....	$\frac{1}{8}$	2 $\frac{1}{2}$
				do .....	Sweated and riveted .....	$\frac{1}{8}$	2 $\frac{1}{2}$
III'	8	18 $\frac{1}{2}$	.238	Copper .....	Part of pipe reinforced.....	$\frac{1}{8}$	2 $\frac{1}{2}$
				Soft bronze ...	Brazed and riveted .....	$\frac{1}{8}$	2 $\frac{1}{2}$
IIII	8	18 $\frac{1}{2}$	.254	Hard bronze ..	Sweated and riveted .....	$\frac{1}{8}$	2 $\frac{1}{2}$
				Copper .....	Part of pipe reinforced.....	$\frac{1}{8}$	2 $\frac{1}{2}$
IIII'	8	18 $\frac{1}{2}$	.254	Copper .....	Part of pipe reinforced .....	$\frac{1}{8}$	2 $\frac{1}{2}$
				Soft bronze ...	Brazed and riveted .....	$\frac{1}{8}$	2 $\frac{1}{2}$

TABLE I.—Continued.

Number of pipe.	Temperature, Fahr.	Bursting pressure in pounds per square inch.	Distension at bands in inches.				Location of rupture.	Appearance of fracture.
			A.	B.	C.	D.		
I	350	835	0.8	0.	0.	0.6	Along edge of overlap between bands I and II.	Square and granular; one-half discolored.
II	do.	785	0.3	0.	0.	0.4	Along edge of overlap under band III.	Do.
III	do.	950	1.5	2.0	.....	.....	About 1 inch from joint near middle of pipe.	Square and granular; one-third discolored.
III'	do.	950	.....	.....	0.7	0.7	Along edge of overlap near inner flange.	Square and granular; two-thirds discolored.
IIII	do.	1,225	0.3	0.4	.....	.....	Along edge of overlap near middle of pipe; 2 inches from joint.	Square and granular; one-third discolored.
IIII'	do.	1,275	.....	.....	0.4	2.0	Through underlap, one-fourth inch from edge of overlap.	Square and granular at middle 45° and fibrous at ends.

## SUPPLEMENTARY TESTS.

After the pipes had been tested they were cut up and specimens for test by tension obtained from the portions nearest the joint, opposite the joint, midway between these two, and across the joint. The first three were cut from the pipe in a longitudinal direction, and therefore across the direction in which the sheet was rolled, but it was determined by the test of a number of other specimens that there was little, if any, difference in the strength of the metal when broken in each of these directions. The specimens were 6 inches long between fillets and 2 inches wide. Their original thickness was used in the calculations for strength per square inch. The results of these tests are given below in Table II.

TABLE II.

[Specimens 1 and 2, from metal opposite joint. Specimens 3 and 4, from metal at 90° from joint. Specimens 5 and 6, from metal adjoining joint. Specimens 7, 8, and 9, from metal across joint.]

Number of specimen.	Pipe No. I.		Pipe No. II.		Pipe No. III.	
	Breaking strain.	Extension.	Breaking strain.	Extension.	Breaking strain.	Extension.
	<i>Per sq. in.</i>	<i>Per cent.</i>	<i>Per sq. in.</i>	<i>Per cent.</i>	<i>Per sq. in.</i>	<i>Per cent.</i>
1.....	30,580	20.6	31,050	38.8	29,610	25.0
2.....	30,330	18.3	31,070	37.7	28,000	22.1
Mean.....	30,455	19.4	31,060	38.2	28,805	23.5
3.....	29,600	24.2	30,850	24.0	29,430	24.7
4.....	29,200	16.7	30,800	24.5	28,320	18.4
Mean.....	29,400	20.4	30,825	24.5	28,875	21.5
5.....	28,330	*12.9	30,170	16.4	27,080	12.6
6.....	28,790	16.7	29,820	9.2	26,520	*10.8
Mean.....	28,560	14.8	29,995	12.8	26,800	11.7
7.....	23,090	†1.0	25,000	‡3.8	23,310	†6.7
8.....	20,620	†1.1	24,230	‡3.2	25,110	†8.4
9.....	25,360	‡4.6	21,230	†2.4	24,850	‡9.2
Mean.....	23,030	2.2	23,487	3.1	24,423	8.1

Number of specimen.	Pipe No. IIP.		Pipe No. IIIP.		Pipe No. IIIP.	
	Breaking strain.	Extension.	Breaking strain.	Extension.	Breaking strain.	Extension.
	<i>Per sq. in.</i>	<i>Per cent.</i>	<i>Per sq. in.</i>	<i>Per cent.</i>	<i>Per sq. in.</i>	<i>Per cent.</i>
1.....	29,900	33.9	29,480	24.7	30,370	37.5
2.....	29,640	27.1	30,140	29.3	29,650	33.1
Mean.....	29,770	30.5	29,810	27.2	30,010	35.3
3.....	28,920	24.2	28,730	22.2	30,460	36.4
4.....	29,700	28.2	29,300	24.8	29,080	20.7
Mean.....	29,310	26.2	29,015	23.5	29,760	30.1
5.....	27,230	19.3	27,440	12.5	28,140	16.2
6.....	24,060	†4.6	26,070	†10.0	28,470	13.6
Mean.....	25,645	12.0	26,755	11.3	28,305	15.0
7.....	21,850	†18.8	23,170	‡3.4	24,770	†6.1
8.....	20,930	†7.1	24,790	†6.1	28,600	†11.3
9.....	25,380	†9.7	26,450	†10.6	27,510	†9.2
Mean.....	23,720	11.0	24,803	6.7	26,960	8.8

\* Fibrous granular.

† Granular.

‡ Granular fibrous.

The metal in the fractures of the specimens was fibrous, unless otherwise indicated by † (granular), ‡ (granular fibrous), or \* (fibrous granular), the first adjective showing which characteristic was in preponderance. The fibrous fracture was invariably inclined at an angle of about 45°, while the granular fracture was square, to

the plane of the specimen. Of the eighteen specimens from across the joint, thirteen broke at the edge of the overlap, two at the edge of the inner lap, two outside, and one through the joint.

Specimens obtained from the same lot of sheet copper that was employed in making the pipes were also tested for tensile strength, after the metal had been subjected to various treatments, analogous to those which it might experience in the manufacture and service of a pipe, as follows:

- (1) Untreated.
- (2) Annealed.
- (3) Planished.
- (4) Subjected to a degree of heat sufficient to cause brazing metal to flow, and annealed.
- (5) Subjected to a degree of heat sufficient to cause brazing metal to flow, allowed to cool slowly, and then planished.
- (6) Subjected to a white heat and annealed.
- (7) Subjected to a white heat, allowed to cool slowly, and then planished.
- (8) Subjected to a degree of heat sufficient to cause the surface copper to "pimple," and annealed.
- (9) Subjected to a degree of heat sufficient to cause the surface metal to "pimple," allowed to cool slowly, and then planished.
- (10) Untreated. Broken in oil bath at a temperature of 350° F.
- (11) Annealed. Broken in oil bath at a temperature of 350° F.
- (12) Planished. Broken in oil bath at a temperature of 350° F.
- (13) Annealed. Broken in oil bath at a temperature of 360° F.
- (14) With a brazed joint at the middle; annealed.
- (15) With a brazed joint at the middle; planished.
- (16) With a brazed joint at the middle; annealed. Broken in oil bath at a temperature of 350° F.

There were ten specimens in each lot, and they were all 2 inches wide by 6 inches between fillets. The specimens with a brazed joint were made by brazing two flat pieces together, and afterwards cutting down to size. The chamfer and lap were 1 inch wide as in the pipes. The planished specimens were cut to size before planishing, and the original area being used in the calculations for strength per square inch the results are directly comparable with those obtained from the untreated and annealed specimens. Had the reduced area after planishing been used, the gain in strength by the treatment would have been considerably greater. The results of these tests is given below in Table III.

TABLE III.

Number of specimen.	Lot No. 1.		Lot No. 2.		Lot No. 3.		Lot No. 4.		Lot No. 5.	
	As cut from sheet.		Annealed.		Planished.		Heated sufficiently to flow spelter.			
							Annealed.		Planished.	
	Break- ing strain.	Exten- sion.	Break- ing strain.	Exten- sion.	Break- ing strain.	Exten- sion.	Break- ing strain.	Exten- sion.	Break- ing strain.	Exten- sion.
	<i>Per sq. in.</i>	<i>Per ct.</i>	<i>Per sq. in.</i>	<i>Per ct.</i>	<i>Per sq. in.</i>	<i>Per ct.</i>	<i>Per sq. in.</i>	<i>Per ct.</i>	<i>Per sq. in.</i>	<i>Per ct.</i>
1.....	30,000	28.3	29,265	44.8	32,200	35.5	29,800	49.2	31,230	30.7
2.....	29,620	21.2	30,430	53.8	32,100	36.1	30,390	49.5	30,890	25.6
3.....	31,240	37.3	30,100	44.5	30,775	28.3	29,270	45.9	30,610	26.0
4.....	30,970	36.4	29,800	44.6	31,720	36.2	28,940	39.9	30,800	28.4
5.....	31,440	40.3	30,560	48.3	30,800	25.7	29,870	46.3	31,500	36.4
6.....	31,280	39.7	30,645	50.8	30,310	22.0	29,600	48.2	31,570	35.9
7.....	30,240	30.1	29,630	46.7	31,360	31.5	29,650	47.3	30,770	28.4
8.....	30,080	33.2	30,110	47.6	32,060	34.5	29,020	42.8	30,340	21.7
9.....	31,950	22.7	29,980	40.0	31,110	31.2	29,570	43.4	31,180	31.6
10.....	30,760	20.4	30,420	44.2	30,805	21.3	29,800	44.7	31,410	35.4
Average.	30,848	30.96	30,094	46.53	31,324	30.26	29,591	45.72	31,090	30.91

TABLE III.—Continued.

Number of speci- men.	Lot No. 6.				Lot No. 7.		Lot No. 8.		Lot No. 9.			
	Heated to white heat.								Heated to "pimpling" heat.			
	Annealed.		Planished.		Annealed.		Planished.					
	Breaking strain.	Exten- sion.	Breaking strain.	Exten- sion.	Breaking strain.	Exten- sion.	Breaking strain.	Exten- sion.				
	<i>Per sq. in.</i>	<i>Per cent.</i>	<i>Per sq. in.</i>	<i>Per cent.</i>	<i>Per sq. in.</i>	<i>Per cent.</i>	<i>Per sq. in.</i>	<i>Per cent.</i>				
1.....	28,750	39.6	30,520	28.3	25,690	124.1	25,550	16.				
2.....	29,850	49.6	29,840	18.8	22,280	123.1	24,710	11.4				
3.....	29,800	49.2	31,300	36.2	23,340	122.7	24,120	15.6				
4.....	28,400	38.8	30,740	29.6	24,120	125.4	24,630	15.8				
5.....	29,490	45.4	30,260	24.3	25,210	121.3	25,490	14.4				
6.....	28,160	35.3	30,130	26.0	22,420	116.4	23,780	19.0				
7.....	28,700	37.8	30,820	29.7	21,550	114.2	26,460	110.1				
8.....	29,920	51.2	31,230	35.4	24,060	118.0	24,940	15.4				
9.....	29,680	48.4	30,760	29.2	23,980	118.6	22,780	11.2				
10.....	29,830	49.6	30,350	25.4	23,560	120.1	25,770	14.6				
Average.....	29,258	44.49	30,595	28.29	23,621	20.39	24,823	5.35				

Number of speci- men.	Lot No. 10.		Lot No. 11.		Lot No. 12.		Lot No. 13.			
	Broken in oil bath at 350° Fah.								Broken at 360° Fah.	
	As cut from sheet.		Annealed.		Planished.		Annealed.			
	Breaking strain.	Exten- sion.	Breaking strain.	Exten- sion.	Breaking strain.	Exten- sion.	Breaking strain.	Exten- sion.		
	<i>Per sq. in.</i>	<i>Per cent.</i>	<i>Per sq. in.</i>	<i>Per cent.</i>	<i>Per sq. in.</i>	<i>Per cent.</i>	<i>Per sq. in.</i>	<i>Per cent.</i>		
1.....	25,720	30.6	25,420	48.0	26,500	27.9	24,640	42.9		
2.....	26,330	37.1	26,030	55.1	25,820	18.9	25,430	54.7		
3.....	25,180	24.2	25,160	47.3	26,130	22.8	25,110	50.3		
4.....	25,560	26.3	25,300	46.8	26,140	22.7	24,820	48.7		
5.....	26,270	34.9	25,680	46.1	27,110	31.2	25,100	47.2		
6.....	25,880	31.3	24,670	44.9	25,860	20.1	24,950	44.6		
7.....	26,240	33.7	25,460	48.1	26,620	28.4	25,430	51.8		
8.....	25,420	27.6	25,300	47.2	26,230	25.0	24,530	43.2		
9.....	26,050	31.4	24,770	53.2	25,960	18.7	25,080	48.9		
10.....	25,980	32.0	24,950	45.0	27,030	32.1	25,420	50.1		
Average.....	25,863	30.91	25,320	48.17	26,340	24.78	25,050	48.24		

Number of speci- men.	Lot No. 14.		Lot No. 15.		Lot No. 16.		Lot No. 17.					
	With brazed joint at the middle.								With brazed joint broken at 350° Fah.			
	Annealed.		Planished.		Annealed.		Planished.					
	Breaking strain.	Exten- sion.	Breaking strain.	Exten- sion.	Breaking strain.	Exten- sion.	Breaking strain.	Exten- sion.				
	<i>Per sq. in.</i>	<i>Per cent.</i>	<i>Per sq. in.</i>	<i>Per cent.</i>	<i>Per sq. in.</i>	<i>Per cent.</i>	<i>Per sq. in.</i>	<i>Per cent.</i>				
1.....	27,390	25.5	31,500	28.0	23,120	17.1	25,420	114.3				
2.....	26,080	24.3	27,760	110.7	23,295	21.7	21,860	77.1				
3.....	25,080	114.3	30,880	25.7	21,840	113.7	25,400	20.0				
4.....	29,750	35.7	31,230	29.7	21,230	114.3	24,600	12.7				
5.....	26,495	29.0	27,860	120.3	20,410	110.7	23,980	79.6				
6.....	27,550	127.6	28,320	122.4	22,760	16.9	25,360	15.7				
7.....	27,125	128.0	30,010	26.3	22,960	15.0	26,220	29.7				
8.....	28,820	30.4	31,200	25.6	23,870	26.4	23,930	111.9				
9.....	27,040	122.4	27,260	120.7	20,350	111.7	25,140	18.2				
10.....	25,340	118.6	30,450	123.4	22,915	17.8	25,020	111.7				
Average.....	27,067	24.68	29,648	22.38	22,275	16.53	24,693	14.69				

As in Table II, unless otherwise indicated by † (granular), ‡ (granular fibrous), or \* (fibrous granular), the fractures were inclined and fibrous.

The fractures started, almost invariably, on that side of the specimen which had been exposed to the fire. The brazed specimens in most instances gave way at the edge of the lap, and more frequently than the other specimens, on the side that had not been directly exposed to the flames. Whenever this occurred, however, it was



found that the fracture had started at a point where there had been some brazing metal left on the surface, which having little extensibility, would crack when it had been slightly stretched, and the crack, extending into the copper, would cause the specimen to give way.

## SUMMARY OF RESULTS IN TABLE III.

In the calculations for per cent loss of strength (columns 4 and 5), the strength of the untreated, annealed and planished specimens are each considered as 100 per cent in their respective columns.

Treatment of specimens.	Tensile strength in pounds per square inch.		Excess of strength of planished over annealed specimens.	Loss of strength by treatment.	
	Annealed.	Planished.		Annealed.	Planished.
Untreated.....	30,094	31,324	Per cent. 4.09	Per cent. ....	Per cent. ....
Subjected to brazing heat .....	29,591	31,030	4.86	1.67	0.94
Subjected to white heat .....	29,258	30,595	4.57	2.78	2.33
Subjected to "pimpling" heat .....	23,621	24,823	5.09	21.50	20.75
Broken at 350° Fah. ....	25,320	26,340	4.03	15.86	15.91
Broken at 360° Fah. ....	25,050	.....	.....	16.76	.....
With brazed joint .....	27,067	29,648	9.54	10.06	5.35
With brazed joint, broken at 350° Fah. ....	22,275	24,093	10.85	25.98	21.17

Tensile strength of metal, as cut from sheet .....	30,848
Tensile strength of metal, as cut from sheet, at 350° Fah. ....	25,863
Loss of strength of metal, as cut from sheet, at 350° Fah. ....	per cent. 16.16
Loss of strength of brazed joint, annealed, at 350° .....	do. 17.70
Loss of strength of brazed joint, planished, at 350° .....	do. 16.71

## DISCUSSION OF RESULTS.

The figures in Table III show the injurious action of heat upon copper sheet, and that, while a white heat does not change the character of the metal, a heat of only slightly greater degree causes it to lose the fibrous nature that it has acquired in rolling, and a serious reduction in its tensile strength and ductility results. When it has undergone this change the fracture is invariably square to the plane of the specimen, and the metal has a granular, and in aggravated cases, a crystalline appearance; while, in its normal condition, the metal always fractures in a plane inclined at about 45° to that of the specimen, and displays a fibrous, silky nature. A temperature considerably below a white heat is all that is necessary in making a brazed joint; yet, in all of the tested pipes, the fractures were square and granular, thus giving positive evidence that the metal, at least at the point of rupture, had been burned. That this was not the only point at which it had suffered, was demonstrated by the test specimens cut from the pipes, many of which, as a reference to Table II will show, broke with this characteristic fracture. A reference to Table III will show that many of the specimens that were brazed separately, had also undergone this change. All the brazing was done by expert workmen, and their failure to make a pipe joint without burning the metal at some point, makes it probable that, with copper of this or greater thickness, it is seldom accomplished.

That it is possible to make a joint without thus injuring the metal was proven in the cases of many of the specimens, both of those cut from the pipes and those made separately, which broke with a fibrous fracture.

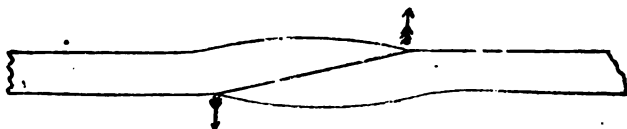
The trouble lies in the fact that the copper-smith, in making a joint, adjusts his heat by observing the glow and the freedom with which his spelter runs on the inside of the pipe. While these are sufficiently accurate indications of the temperature existing at the inside surface of the pipe, they may be delusive in regard to the temperature at the outside surface. In the fractures of many specimens the metal was granular through only a portion of its thickness, and always on the side that had been exposed to the fire, showing that this side had been burned while the other side had not. For the sake of demonstration this state was afterwards produced in a number of cases, and it was found that it would most readily happen when the metal was brought quickly to its heat and kept there for only a short time. Under these conditions the temperature of the outside metal would increase much more rapidly than the inside, and when the latter was only at a brazing glow the former would be at a burning heat. The removal from the fire would check the destructive action before it had penetrated to the inside or given any indication to the copper-smith that it had occurred. From this it would appear that burning will generally result when an attempt to hurry the work is made.



A charcoal or coke fire under blast, unless as is not generally the case in a copper-smith's forge, it is heavy, is not only unsteady from the fact that the fuel consumes rapidly, but is also of irregular intensity at different portions, and occasionally intense heat will occur at a single point. Under these conditions, even if raised to a heat slowly, the metal may be burned.

With a steady heat, and one that could be nicely adjusted, such as would be furnished by a gas flame, which would also permit of both sides of the pipe being directly heated, much better results would probably be obtained.

The burning of the metal accounts for the weakness of the pipe in the vicinity of the brazed joint; but that the failure generally occurs at the edge of the overlap is due to the nature of the strain at this point. The departure of the pipe from a true cylindrical form, by reason of the increased thickness at the joint, causes the strain at each side of the joint to act in parallel, but not coincident, lines, thus producing a couple as shown in sketch.



The strain produced by the couple acts equally at the edge of the overlap and underlap, but as the strain on the outside of the pipe is naturally greater than on the inside the point of maximum strain is at the edge of the overlap. Another cause which in a planished pipe tends to somewhat weaken it at the edges of the laps is the slight shoulder which is formed by hammering down the edge of the lap. The shoulder is always more pronounced on the outside, as there is where the hammering is done. Thus, as the point of least resistance and of greatest strain are coincident, it is not surprising that the pipes give way at a pressure considerably below their calculated strength.

In the following table a comparison can be made of the actual bursting pressure and the theoretical bursting pressure of the pipes as calculated by using the figures adduced in Table III, for the strength of copper sheet with a brazed joint at 350° F.

Pipes I and II are considered as having been annealed. The maximum thickness at joint is that at the point of rupture.

TABLE V.

Pipe number.	Bursting pressure, pounds per square inch.			Thickness at joint.	
	Actual.	Theoretical.	Difference.	Maximum.	Relative.
I	835	1,336	501	.362	1.5
II	785	1,336	551	.383	1.6
III	950	1,469	519	.306	1.3
III'	950	1,469	519	.342	1.4
IIII	1,225	1,568	343	.301	1.2
IIII'	1,275	1,568	293	.325	1.3

That in every case the actual falls below the theoretical bursting pressure by a considerable amount is principally due to the fact that the pipe selects the point of weakest rather than of average strength at which to give way. But taking pipe No. III or III', for instance, in which there were not, as in pipes I and II, irregular strains, which are referred to later, the tensile strength shown by the metal in the pipe was about 16,000 pounds per square inch, which is much less than that shown by the weakest specimen. The only practical difference in the conditions of test of the metal in the pipes and in the specimens is that in one case it is in cylindrical form and in the other it is straight; and it is to this that most of the difference in results must be attributed. In the test of a specimen the strain is evenly distributed, and each fiber or granule sustains its share of the strain; but in the pipe the outer fibers, which, as we have already seen, are the weakest and least ductile, are called upon to sustain the greatest strain. When their limit is reached they let go and the strain is transferred inwardly to the contiguous fibers, which, being stronger, are able to withstand the increased burden, until by increase of the pressure they too are over-weighted. Thus there is a gradual letting go until the pipe is ruptured. The discolorations in the fractures are evidence of this action.

As indicating the importance of the couple action, it will be seen that the differences between the actual and theoretical bursting pressure and the relative thickness of the joint vary in nearly the same order. In the case of pipes III and III', while the relative thickness of the joint of the latter is greater, the differences are the same. It will be remembered, however, that in the test of these pipes a great many surface cracks were developed, showing that they had been badly burned, and that the cracks were more numerous and larger in the former, showing that it had suffered more. Such being the case, the fact that it reached the same figure as pipe III' was due probably to the smaller moment at the joint. In the case of pipes IIII and IIII' the order is apparently reversed; but in this case also the former pipe has suffered more severely in the brazing as indicated by the surface cracks which made their appearance during the test, one of which developed into a rupture, while none at all appeared on the latter pipe.

Another point which should be noticed in this connection is the locality of the rupture in pipes III, IIII, and IIII' (see Table I), the one in which the relative thickness of the joint, and consequently the moment of the couple, was least. They occurred in pipe III at 1 inch from the edge of the overlap; in pipe IIII two ruptures, one 2 inches from and the other at the edge of the overlap; and, in pipe IIII', through the underlap, one-quarter inch from the edge of the overlap. In all of the other pipes the rupture was at the edge of the overlap. Thus it would appear that, with a relative thickness at the joint of 1.2 or 1.3, the couple ceases to be the dominant influence in deciding where the pipe shall give way.

While, therefore, a thin joint is desirable, it is probable, judging from the rupture in pipe IIII', that a joint with a relative thickness less than the above figures would develop a point of weakness through the laps. It was also determined by the tests of several specimens with brazed joints, in which the laps were of different lengths, that their strength increases with the length of the lap which follows naturally from the action of the couple. On the other hand, the difficulty of making a good joint increases rapidly with the length of the lap. These considerations lead to the conclusion that for pipes of the diameter and thickness of those tested the best dimensions for the joint are a maximum thickness of from 1.2 to 1.3, and the length of the lap from four to five times the thickness of the sheet.

Nothing was positively determined in regard to the effect on the strength of the pipe of the use of clamps in the joint. They were used only in pipe IIII, and it was noted during the test that the brazed joint near the inner clamp appeared to be slipping. As the rupture afterwards occurred at this point it may be that they introduce an element of weakness through the change in direction in the couple strain, or, as the course of the channel through which the brazing metal runs is suddenly changed, there may be more danger of defective brazing at this point.

It will be seen in Table I, and also in cut No. 1, that pipes I and II were distended only near the ends. The metal here has a lower elastic limit, due to the annealing that attends the brazing on of the flanges, and therefore yields more readily than the other portions. It also appears, from the location of the ruptures, that there is a tendency to give way at about the junction between the soft ends and the harder intermediate portion, because of the irregular strains which are set up by the different extensions of the metal at this point.

It is evident that, to attain the best results, the nature of the metal should be the same throughout the length of the pipe; and this condition can be attained by annealing or planishing it after the other work has been done, or, as is sometimes the practice, to avoid the danger of changing the form or length of a pipe after it has been made to a template, it is planished to within a few inches of the end before the flanges are put on, and finished afterwards. Of the two processes, it is plain that planishing is preferable. The loss of ductility which results from the treatment is more than offset by the gain in strength of the sheet, but it is at the joint that the principal advantage is obtained. From the summary of Table III we see that, while the difference in strength between the annealed and planished specimens without joints is from 4 to 5 per cent, in the case of specimens with joints it is from 9.5 to 11 per cent. The greater difference is accounted for by the increased resistance to bending which the specimen opposes to the action of the couple. In planishing a joint, however, unless the work is done properly, it may lose rather than gain strength by the operation. The planishing should be commenced at the back of the lap and carried forward to the edge; for if it is commenced at the edge the lap at this part, having become stiffened, will separate from the brazing metal and curl up as the work progresses backward.

The distension of the planished pipes was fairly uniform at the different bands until, in the case of pipes III and III', they had been again subjected to heat, and submitted to test without being replanished.

A comparison of the results attained in the tests of pipes I and II shows nothing in favor of the banded pipe, and, on the contrary, it appears possible that, under the conditions of test, the bands may have exerted a detrimental influence on the

final strength of the pipe. Placed as the outside bands were, just at the edge of the soft metal at the ends, they probably accentuated the irregular strains which have been before referred to as occurring at this point, and caused the pipe to give way at a lower pressure than it would had they not been used.

In any case it is shown that the bands, when spaced as they were, offer little support to the intermediate metal if it be soft. Had the outside bands been placed over the middle instead of at the edge of the soft portion, or, which is practically the same thing, had the bands been spaced at a less interval on the pipe, they might have somewhat increased its strength.

As neither the banded nor unbanded pipe was distended in the harder metal between the ends it could not be determined whether the bands were sufficiently close together to materially reinforce the intermediate metal when hard. Judging from the location of the rupture in pipes III' and IIII', however, which occurred near the ends where the flanges would act in practically the same manner as a band in preference to the unsupported middle portion, it is probable that even in the case of a planished pipe the supporting influence of a band would not be important beyond 2 or 3 inches from where it was placed.

Of all the specimens tested the weakest was No. 8 of the pipe No. 1 (see Table II), which, at atmospheric temperature, had a tensile strength of 20,620 pounds per square inch. Reducing this by 17.7 per cent would make its strength, at 350° F., 19,032 pounds per square inch. Using this figure as the strength of metal in a pipe, the bursting pressure would be 1,442 pounds. Still further reducing this result by the greatest difference between the theoretical and actual bursting pressures obtained in the tests, 551 pounds, which is manifestly a large allowance, as only a part of this difference is attributable to the cylindrical form, we have remaining as the pressure at which the pipe will give way 591 pounds, which is about four times the steam pressure that the pipe will be called upon to withstand.

It would appear, therefore, that unless the workmanship is extremely bad, in which case it would be detected by inspection, there is little chance of a pipe failing under the normal condition of service. The failures that do occur must, except in rare cases, be attributed to careless inspection or the presence of a water hammer, against the action of which no pipe is safe.

In regard to the cone joint that was tried on pipe III, it was found that owing to the greater resistance to compression of the metal in the brazed joint the outside rings would not pull up squarely, and the joint would leak persistently at this point. In an attempt to make the joint tight, by setting up hard on the nuts, the inside ring was buckled in the wake of the brazed joints. A heavier ring was substituted, but with no better results. Even if the metal in the pipes was of uniform compressibility it is not probable that the joint could be kept tight, for the greater expansion by heat of the composition ring compressed the copper between it and the outside iron rings, so that the joint was found to be always loose after having been subjected to heat. When the pipe had cooled, after having been raised to a temperature of 350° F., the nuts could frequently be set up by hand.

The flange joint that was tried on one of the sections of pipe III after the cone joint had been abandoned, and on pipe IIII, was tight up to 600 pounds per square inch, when the springing of the joint by pressure on the heads was sufficient to allow it to leak. The joint involves less labor and skill in its manufacture than a brazed and riveted flange joint, and obviates the danger of burning to which the pipe is exposed in brazing on the flanges. It also possesses the advantage of having no rivets, the presence of which is always attended with more or less leakage. An objection to the joint, which, although it did not develop itself during the tests, would probably do so in service, is the hardening of the metal at the turn of the flange, which might occur from the working of the pipe, due to expansion or contraction, and the working of the ship, and which in time would probably result in a crack at this point.

Appropos to riveting the flanges, it was found that the best method was to braze on the flanges first, and then drill the holes and drive the rivets; as, if the rivets are put in first, the heat to which they are subjected in the brazing, wastes and strains them so that, although they may be hammered up afterwards, some of them will leak.

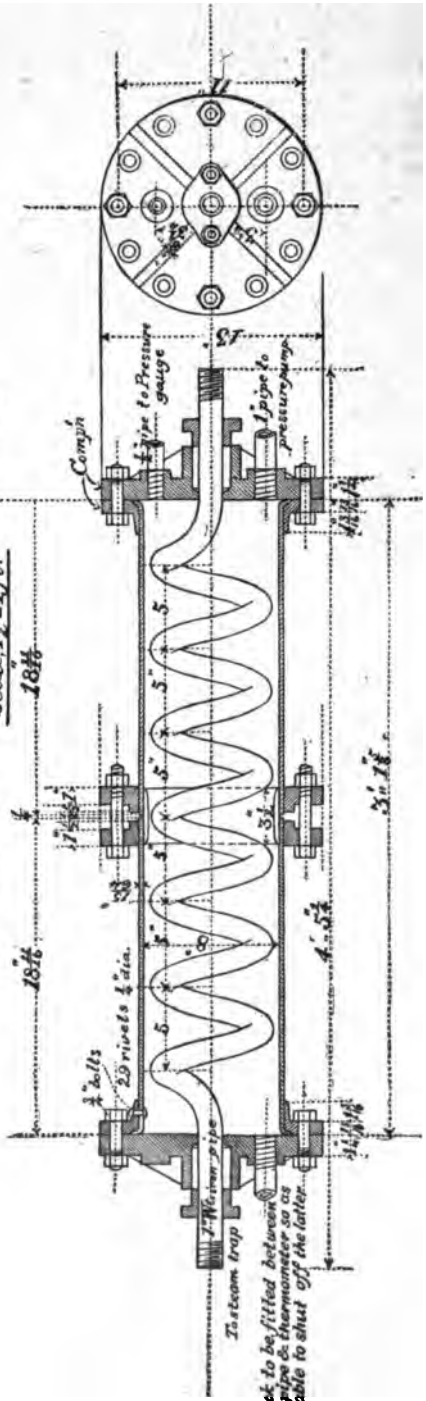
The sweated flanges on pipes III and IIII appeared to be equally efficient with the brazed flanges; and as the solder melts at 590°, while the melting point of brazing metal is about twice as high, the pipe is exposed to less danger of overheating in putting them on. They also permit of the use of a lighter flange from the fact that a stronger bronze, containing more zinc and less copper, can be used without the danger of its being injured in the brazing. It is possible, however, that the sweated joint would be more easily started by a shock or jar than would the brazed joint, although neither of the sweated joints tried was started by the shock of the pipe explosion.

The flanges of soft bronze were in every case "dished" by the endwise pressure from one-eighth to one-fourth inch, and, as was before noted, the bosses were ruptured in two cases. Their strength, however, seems to be well adjusted to that of the pipe. The flange of stiff bronze on pipe IIII was "dished" three thirty-seconds of an inch.

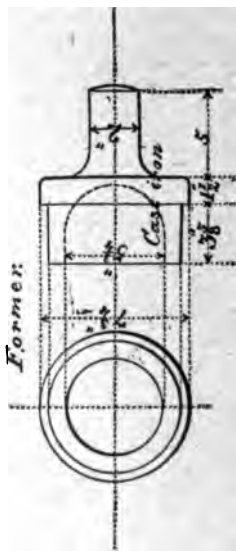
With regard to the material used for gaskets in the joints, many kinds were tried, including tough paper with red lead, wire gauze with red-lead putty, wire gauze with usudurian, sheet lead, "common sense," and others. One of the most satisfactory was made of annealed copper tubing of small diameter, with a core of soft wood; but it was found that a joint made of one-fourth inch asbestos board best stood the conditions of test.

The stuffing boxes were packed with braided flax, and could be easily kept tight; but the glands required frequent setting up, as the material burned out rapidly.

*Experimental Copper Pipe*  
*Scale, H-1 1/2.*

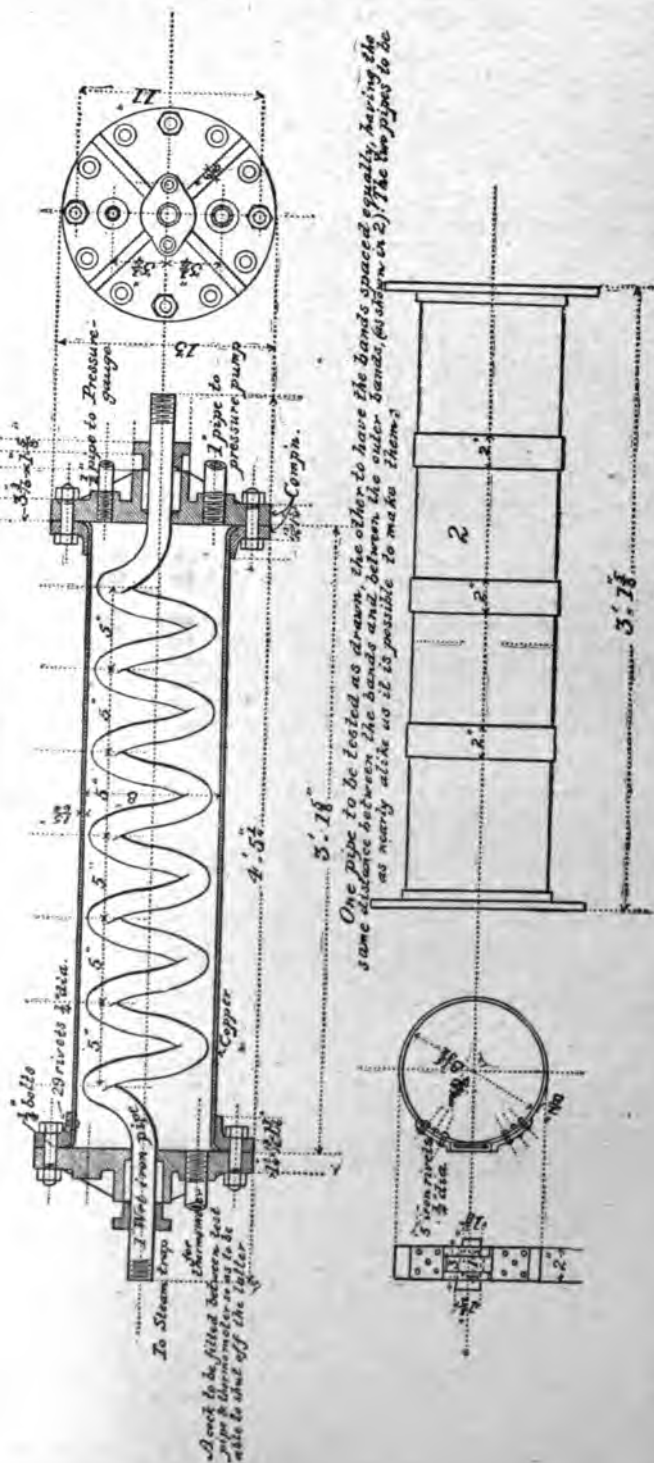


*A coat to be fitted between test pipe & thermometer so as to be able to shut off the latter.*



### Experimental Copper Pipe.

Scale  $I_2 = 1 \text{ ft.}$



To Steam traps

Back to be filled between test  
pipe & thermocouple so as to be  
able to shut off the valve.

## APPENDIX C.

### SPEED AND POWER TRIALS OF UNITED STATES STEAM TUGS WAHNETA, IWANA AND NARKEETA.

These tugs were all built by Harrison Loring, of South Boston, Mass., from designs by the Department.

The hull dimensions are as follows:

Length between perpendiculars, 92 feet 6 inches.  
Beam at water line, 20 feet 11½ inches.  
Mean draft, 8 feet.  
Displacement, 192.4 tons.  
Coal capacity, 35 tons.

Each tug has a vertical triple-expansion engine driving a single screw. The cylinders are 13, 20, and 31½ inches diameter, with a stroke of 24 inches. The steam pressure is 160 pounds and the estimated I. H. P. of the main engine about 350 at 114 revolutions.

There is one plug piston valve to the H. P. cylinder, two plug piston valves to the I. P. cylinder, and one single ported flat slide valve to the L. P. cylinder. All are driven by Stephenson double bar links.

The condenser has 604.4 square feet of cooling surface, and has a Blake combined air and circulating pump. The cylinder diameters are: Steam, 8 inches; air, 10 inches; circulating, 12 inches; stroke of all, 12 inches.

The boiler is 11 feet mean diameter and 11 feet long. There are two corrugated furnaces, 42 inches internal diameter. The tubes are 3 inches external diameter. The grate surface is 49 square feet, and the heating surface, 1,350 square feet; a ratio of 27.6. The working pressure is 160 pounds.

The screw propeller is of the modified Griffith type, made of cast iron, and four bladed. The diameter is 7 feet 6 inches; pitch (true screw), 12 feet 6 inches; helical area, 22.5 square feet.

#### *Weights (in tons).*

Propelling engine.....	11.40
Propellers.....	1.15
Line and propeller shafting, thrust bearing, stern tubes, etc.....	3.61
Main steam and exhaust pipes, throttle valve, drain cocks and pipes, oil cups and pipes, drip pans, etc., on main engine.....	1.04
Gauges, cocks, and pipes on engine and condenser.....	0.03
Condenser, empty.....	3.63
Pipes and valves for circulating water.....	0.52
Air and circulating pumps and engine.....	1.05
Feed pumps.....	0.51
Pipes and valves for auxiliaries.....	1.30
Hand pump and pipes.....	0.05
Boiler, empty, including smoke pipe, uptakes, lagging, grate bars, bearer, etc.....	28.02
Valves, gauge, cocks, and pipes to boiler.....	1.69
Tanks.....	0.21
Floor plates.....	1.21
Water in tanks.....	0.12
Water in condenser, pumps, and pipes.....	0.66
Water in boilers.....	12.50

Total weight of all machinery and water, in steaming condition, but without coal..... 66.70

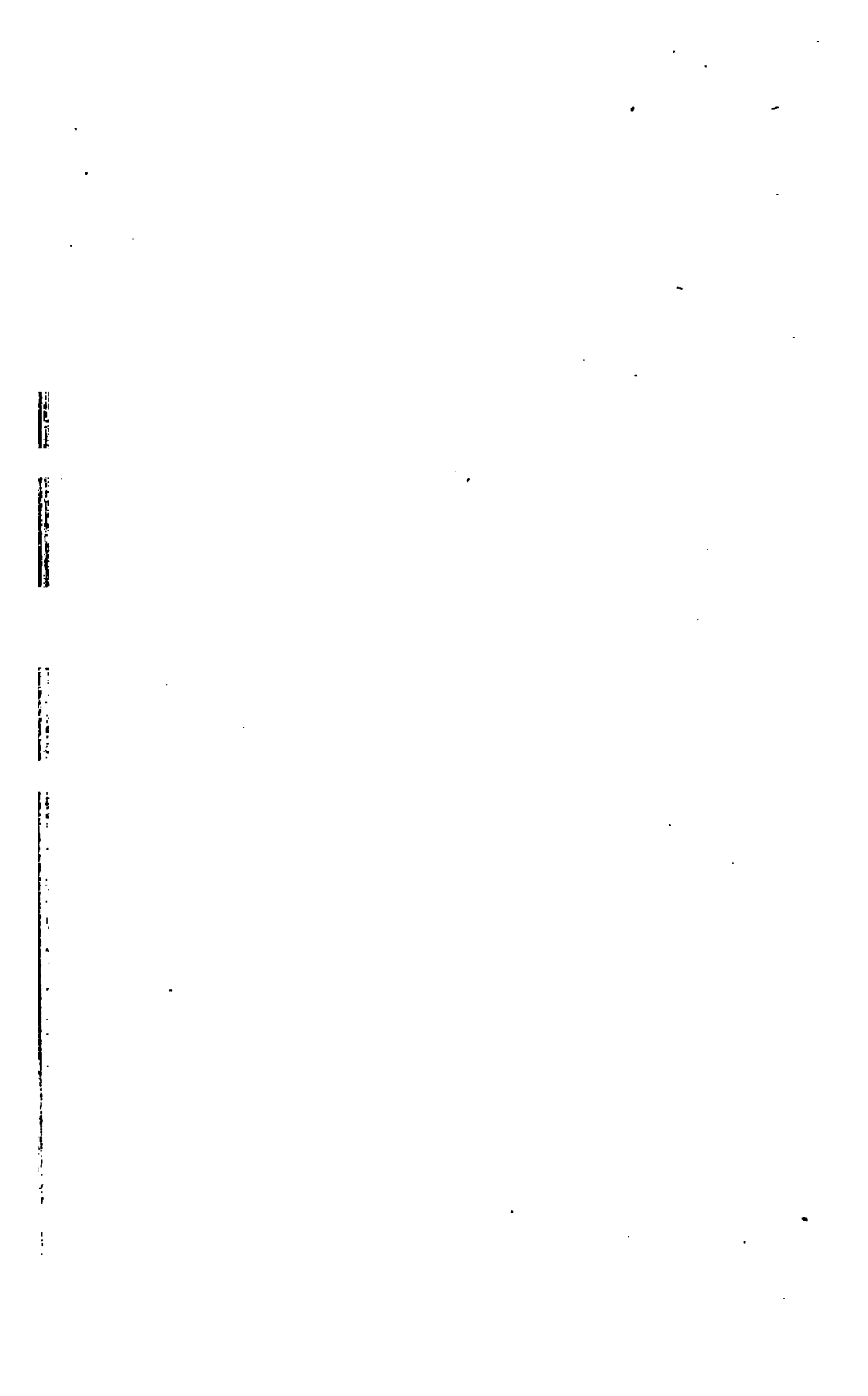
The trials consisted of a run of three hours in free route in Boston Harbor, and one of one hour made fast to dock. The free-route run was arranged so as to include trips in opposite directions over a course 7 knots long, all of which were made during a single tide. The mean speed entered in the tables is the mean from the trips in opposite directions.

*Speed and power trials of the United States steam tugs Wahneta, Iwana, and Narkeeta.*

	Wahneta.		Iwana.		Narkeeta.	
Date of trial .....	March 8, 1892.		March 24, 1892.		February 17, 1892.	
Duration of trial .....	Free route	At dock	Free route	At dock	Free route	At dock
Condition of weather .....	3 hours	1 hour	3 hours	1 hour	3 hours	1 hour
	Calm.		Fair.		Strong breeze; moderate sea.	
Displacement on trial, tons .....	176.5		198.		190.	
Steam pressure—						
At boiler, pounds .....	151.07	147	145.07	146.4	150.4	150.4
At engine, pounds (per gauge) ..	144.50	139	139.3	140.2	146.00	146.8
At first receiver, pounds (absolute) .....	64.10	47.9	61.55	57.1	63.43	65.1
At second receiver, pounds (absolute) .....	17.70	13.9	19.55	17.8	18.15	18.4
Vacuum in condenser, in inches of mercury .....	26.17	25.4	26.25	25.7	25.30	24.85
Revolutions of engine per minute ..	114.56	*123	115.47	*119.17	111.8	101.67
Double strokes of air and circulating pumps per minute .....	45.7	39.6	45.7	43.2	30.3	35
Mean pressures—						
H. P. cylinder .....	61.2	54	53.38	54.33	57.22	56.93
L. P. cylinder .....	33.5	24.55	29.21	24.19	33.94	35.08
L. P. cylinder .....	11.0	8.07	11.16	9.95	10.33	10.55
Aggregate mean pressure reduced to L. P. cylinder .....	34.94	27.17	32.03	28.96	33.77	34.40
I. H. P. by cards—						
H. P. cylinder .....	113.0	107.35	99.1	104.09	102.86	93.05
L. P. cylinder .....	146.0	115.4	128.24	109.61	144.28	135.63
L. P. cylinder .....	118.8	94.4	121.56	111.89	109.00	101.17
Total for main engine .....	377.8	317.15	348.9	325.59	356.14	320.85
I. H. P. estimated—						
Air and circulating pumps .....	3.62	3.05	3.34	3.13	3.42	3.16
Feed pumps .....	2.19	1.84	2.02	1.89	2.07	1.91
I. H. P. of all machinery .....	383.61	322.04	354.26	330.61	361.63	334.92
Speed per hour, in knots .....	11.63	.....	11.58	.....	11.22	.....
Slip of propeller, per cent .....	18.15	.....	19.01	.....	18.98	.....
Indicated thrust of main engine per square foot of developed area of propeller .....	387.02	302.57	354.54	320.59	373.77	380.69
I. H. P. per square foot of grate .....	7.83	6.57	7.23	6.75	7.38	6.84
Heating surface per I. H. P. ....	3.52	4.20	3.80	4.41	3.73	4.04
I. H. P. per ton of machinery .....	5.75	4.83	5.31	4.96	5.42	5.02

\*The increased revolutions at the dock are due to shallow water.





# REPORT

OF

## THE BUREAU OF SUPPLIES AND ACCOUNTS.

NAVY DEPARTMENT,  
BUREAU OF SUPPLIES AND ACCOUNTS,  
*Washington, D. C., October 15, 1892.*

SIR: I have the honor to submit the report of the Paymaster-General of the Navy for the fiscal year ending June 30, 1892, with estimates of appropriations for the coming fiscal year and tabulated statements as follows:

- A.—General financial statement.
- B.—Statement of provisions, clothing and small stores, and contingent.
- C.—Statement of expenditures at shore stations and objects to which applied.
- D.—Statement showing value of real estate and chattels and machinery plant at the several navy-yards and stations June 30, 1892.
- E.—Compilation, showing cost of maintaining all naval vessels in commission during year ending June 30, 1892.
- F.—Value of supplies at shore stations, by classes, June 30, 1892.
- G.—Value of supplies at shore stations, June 30, 1892, under accounts A, B, C, and D.
- H.—Value of supplies afloat, June 30, 1892.
- I.—Statement of public sales and report of deposits on account of sales during the fiscal year 1892.
- J.—Schedule of proposals received.

By act of Congress approved July 19, 1892, this Bureau became in name what for a considerable time it has been in fact, the Bureau of Supplies and Accounts.

Its work during the past year has been accomplished with less friction and greater dispatch than at any previous time since its reorganization.

When it is considered that it is the channel through which flows the daily business of the entire Navy Department, so far as that business relates to supplies and accounts, covering an annual expenditure of millions of dollars in money and material, it may readily be conceived that the detail involved in its work is immense, that the labor demanded is exceedingly great, and that smoothness, promptness, and efficiency can result only from a system thoughtfully planned, patiently developed, and intelligently applied in all its minute details.

In the Bureau of Supplies and Accounts the Navy Department has now within its organization a central office through which every order for purchase and every item of expenditure, whether of money or material, passes, where record is made of them, and where ledger accounts are maintained with all property belonging to the Navy and with all appropriations made for its support.

It is a sort of clearing house, into which there pour daily for record, action, or audit, from the several bureaus and from all naval stations, requisitions, requests for shipments and for purchases, notices of shipments received, money vouchers, inspection reports, and all the multitudinous matter relating to supplies and disbursements, and from which issues the final order for every expenditure and for every payment.

It has been toward the establishment in the Department of such a central office of accounts that your efforts have been directed during your administration, and it can now be said that the object has practically been attained.

The Paymaster-General in his annual report for 1889 said: "The Bureau feels confident that the results shown in this report will prove to be ample warrant for the attempt to organize a central office for the business affairs of the Department."

The results referred to were necessarily meagre, being chiefly preliminary steps in the system which had then but recently been devised and which during the past three years has been developed and improved. As a matter of fact the ledger accounts contemplated and provided for were not started until 1890.

Since that date the accounts have steadily grown in amplitude and value until now they not only present the assets and liabilities of the naval establishment, embrace the receipts and expenditure of all money and all supplies, but they show the charges, to each specific object and under the several appropriations concerned, for all labor and material applied to the construction, equipment, or repair of vessels, structures, plants, chattels, etc.; the cost of production of all articles manufactured by the Government; and the cost of maintaining each navy-yard and every ship in commission.

The system of accounts as developed and now maintained enables the Department to know at all times not only the condition of every naval appropriation, but the precise object to which every expenditure has been applied, thus securing a rigid accountability for all property belonging to the Navy and for all money appropriated for its maintenance and increase.

The allotment of rooms for the use of the Bureau is totally inadequate to its increased work and its necessarily increased force. The allotment is the same to-day as it was in 1889, since which time the force has been nearly doubled. The rooms are crowded to such an extent as seriously to interfere with a satisfactory performance of work. With increased space the details could be handled more expeditiously and the transaction of business greatly facilitated.

I would earnestly urge that additional rooms be assigned to this Bureau for its use.

The close of the last fiscal year showed another large decrease in the amount of supplies on hand. Prior to 1890 there had been a constant yearly increase in the quantity of stores accumulated for the use of the navy, indicating purchases in excess of the needs of the service. One object aimed at in the present system as well as by the law passed in 1890 was to render these accumulated supplies belonging to the several bureaus available for general issue and to confine purchases within the limits of actual requirements.

On June 30, 1890, the total value of all naval supplies in charge of general storekeepers was \$17,307,988.50; on June 30, 1891, it was \$15,870,721.83; on June 30, 1892, it was \$14,722,941.41, a decrease in two years of about \$2,600,000. This showing is exceedingly gratifying

in view of the fact that in the two years immediately preceding 1890 there had been an increase of \$1,446,471.63.

Under the present system purchases are not made if the articles required can be found in stock in any department of any navy-yard and can be supplied advantageously therefrom.

One difficulty the Bureau has to contend with is the lack of an appropriation for handling and transporting stores, which under the law have ceased to belong to particular bureaus, from points where they now lie and where there is little or no demand for them to other points where they could be readily utilized. Some of these supplies have been on hand many years and should be brought into use.

I have asked for an appropriation of \$30,000 for this purpose.

In the purchase of supplies special effort has been made to secure the widest possible competition. The contracts made during the year by the Bureau after public advertisement numbered 891. They were awarded to 338 separate and distinct firms. The bids received for the articles embraced therein numbered 6,725.

The Bureau has endeavored to make as few purchases in open market as possible. The payments during the year on contract, open purchase, and open contract (services) vouchers aggregated \$14,338,914.15 as against \$10,709,571 the year before. Notwithstanding this increased expenditure of \$3,629,343.15, the payments for purchases in open market were less by \$70,000 than they were in the preceding year. Such purchases, with the exceptions mentioned below, are made only when the exigencies of the service demand delivery of supplies in advance of the time required for advertising, and they are authorized by section 3709 of the Revised Statutes.

They include ordnance, gunpowder, and medicine, which under the law are expressly exempted from advertisement.

Deducting from the total amount payments for purchases made for the Bureaus of Ordnance and of Medicine and Surgery, aggregating \$817,565.76, there remains but \$664,709.93 paid for all purchases in open market growing out of the exigencies of the service in a total expenditure of \$14,338,914.15.

Section 3719 of the Revised Statutes provides that proposals in response to public advertisements for furnishing supplies for the use of the Navy shall be accompanied by a written guaranty that the bidder will furnish "a bond with good and sufficient sureties" in case his bid is accepted. This provision of the law deters many manufacturers and dealers of high standing and unquestioned financial responsibility from submitting proposals in response to advertisements. They are willing to furnish the guaranty required in cases where any considerable sum is involved, but are unwilling to undergo the trouble and annoyance incident to furnishing bonds in small transactions and for insignificant amounts.

I would respectfully recommend that Congress be requested to so amend existing law as to permit the Secretary of the Navy, in his discretion, to accept a certified check or cash deposit as security for the execution of a contract in lieu of the guaranty now required by law.

A source of embarrassment is found in the delay necessarily incident to filling emergency requisitions for articles not in store of which purchase must be made. The laws of 1890 and 1891 provide that all supplies purchased from appropriations for the naval service shall be considered as belonging to the Navy and not to any particular bureau.

These laws have an admirable tendency to limit purchases to abso-

lute foreseen necessities, as chiefs of bureaus naturally object to approving requisitions for the purchase of supplies out of appropriations under their control, which may in possible contingencies be diverted to the uses of other departments.

There should, however, be always on hand sufficient supplies to meet constant demands. Delays would be obviated if there could be kept always in store a stock of ordinary commercial articles to be replenished from time to time by requisitions emanating from the general storekeeper.

In order to secure this end by a method that could in no way be objectionable to the several bureaus, I would respectfully recommend that Congress be asked to create a fund amounting to \$200,000 to be known as the supply fund, out of which ordinary commercial articles may be purchased on requisitions originated by general storekeepers and approved by the Paymaster-General; such supplies when issued to the different departments to be charged against the proper appropriation, and the fund reimbursed and in this way kept intact. This would not entail any expenditure in excess of the regular annual appropriation; it would prevent detention of slips needed for sudden and immediate service and would enable the purchase by contract, after public advertisement, of a large quantity of supplies which now must of necessity be procured in the open market under emergency requisitions.

The method of paying employés at the several navy-yards inaugurated during the past year has resulted in a reduction of the time consumed in making payments to a minimum and in a consequent saving to the Government annually of at least \$50,000.

I have the honor to be, very respectfully, your obedient servant,

EDWIN STEWART,  
Paymaster-General, U. S. Navy.

The SECRETARY OF THE NAVY.

*Estimates of appropriations required for the service of the fiscal year ending June 30, 1894,  
by the Bureau of Supplies and Accounts, Navy Department.*

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1893.
<b>SALARIES.</b>			
R. S., p. 27, sec. 167). R. S., p. 70, sec. 416. and act July 16, 1892.			
One chief clerk.....	\$1,800.00		
Two clerks of class 4.....	3,600.00		
Four clerks of class 3.....	6,400.00		
Three clerks of class 2.....	4,200.00		
Two stenographers at \$1,400 each.....	2,800.00		
Eleven clerks of class 1.....	13,200.00		
Two clerks at \$1,000 each.....	2,000.00		
Two copyists at \$500 each.....	1,000.00		
One assistant messenger.....	720.00		
Two laborers, \$600.....	1,200.00		
One clerk of class 2 (submitted).....	1,400.00		
One clerk of class 1 (submitted).....	1,200.00		
One clerk at \$1,000 (submitted).....	1,000.00		
One laborer (submitted).....	600.00	\$42,040.00	\$37,840.00

*Estimates of appropriations required, etc.—Continued.*

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1893.
PROVISIONS, NAVY.			
R. S., p. 733, secs. 3709, 3747; act May 12, 1879, vol. 21, p. 3, sec. 1, and act July 19, 1892.			
For provisions and commuted rations for the seamen and marines, commuted rations for officers and naval cadets on sea duty, and commuted rations stopped on account of sick in hospital and credited to the hospital fund, subsistence of officers and men when unavoidably detained or absent from vessels to which attached under orders (during which subsistence rations to be stopped on board ship and no credit for commutation therefor to be given) and fresh water, not to exceed \$10,000, for drinking and cooking purposes, \$1,000,000; labor in general storehouses and paymasters' offices in navy-yards, and for expenses attending the inspection of supplies, \$100,000 .....	\$1,100,000.00	\$1,100,000.00	\$1,090,000.00
CONTINGENT.			
For freight and express charges; candles, fuel, books and blanks, stationery, advertising; furniture for general storehouses and pay offices in navy-yards; expenses of naval clothing factory and machinery for same; postage, telegrams, telephones, express charges, tolls, ferriages, yeoman's stores, iron safes, newspapers, ice, and other incidental expenses (act July 19, 1892) .....	50,000.00	50,000.00	40,000.00
CIVIL ESTABLISHMENT.			
(Act January 30, 1885, vol. 23, p. 295, sec. 3; act July 19, 1892.)			
Navy-yard, Portsmouth, N. H.: In general storehouses: 2 bookkeepers, at \$1,200 each, \$2,400; 1 assistant bookkeeper, at \$720; 1 bill clerk, at \$1,000; 1 assistant clerk, at \$720; 1 shipping and receiving clerk, at \$1,000 .....	5,840.00		
Navy-yard, Boston, Mass.: In general storehouses: 1 bookkeeper, at \$1,017.25; 1 shipping clerk, at \$1,000; 1 receiving clerk, at \$1,000. In pay office: 1 writer, at \$1,017.25 .....	4,034.50		
Navy-yard, Brooklyn, N. Y.: 1 writer to boards of inspection, \$900. In general storehouses: 3 bookkeepers, at \$1,200 each, \$3,600; 1 assistant bookkeeper, at \$1,000; 1 assistant bookkeeper, at \$720; 3 receiving clerks, at \$4 per diem each; 1 assistant receiving clerk, at \$1,000; 3 shipping clerks at \$1,000 each, \$3,000; 1 bill clerk, at \$1,000; 1 assistant bill clerk, at \$720; 2 leading men, at \$2.50 per diem each; 5 pressmen, at \$2.76 per diem each; 1 superintendent of coffee mills, at \$3 per diem; 1 box maker, at \$3 per diem; 1 engine tender, at \$3.26 per diem; 1 coffee roaster, at \$2.50 per diem; 1 firemen, at \$2 per diem; 1 messenger, at \$2.25 per diem. In pay office: 1 writer, at \$1,017.25; 1 messenger, at \$2.25 per diem .....	28,412.03		
Navy-yard, League Island, Pa.: In general storehouse: 1 bookkeeper, at \$1,200; 1 assistant bookkeeper, at \$720 .....	1,920.00		
Navy-yard, Washington, D. C.: In general storehouse: 1 bookkeeper, at \$1,200; 1 clerk, at \$1,200; 1 receiving clerk, at \$1,000; 1 bill clerk, at \$1,000; 1 shipping clerk, at \$1,000. In pay office: 1 writer, at \$1,017.25 .....	6,417.25		
Naval Academy, Annapolis, Md.: In general storehouse: 1 bookkeeper, at \$1,017.25; 1 receiving and shipping clerk, at \$1,000 .....	2,017.25		
Torpedo Station, Newport, R. I.: In general storehouse: 1 clerk, at \$1,200 .....	1,200.00		
Navy-yard, Norfolk, Va.: In general storehouses: 2 bookkeepers, at \$1,200 each, \$2,400; 2 assistant bookkeepers, at \$1,017.25 each, \$2,034.50; 1 bill clerk, at \$1,000; 1 assistant bill clerk, at \$720; 1 receiving clerk, at \$720; 1 assistant receiving clerk, at \$720. In pay office: 1 writer, at \$1,017.25 .....	8,833.75		

*Estimates of appropriations required, etc.—Continued.*

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1893.
<b>CIVIL ESTABLISHMENT—continued</b>			
Navy-yard, Mare Island, Cal.: In general storehouses: 2 bookkeepers, at \$1,200 each, \$2,400; 2 assistant bookkeepers, at \$720 each, \$1,440; 1 receiving clerk, at \$1,000; 1 shipping clerk, at \$1,000; 1 bill clerk, at \$1,000; 1 assistant clerk, at \$1,000. In pay office: 1 writer, at \$1,017.25 .....	\$8,857.25		
Navy-yard, Brooklyn, N. Y.: In general storekeeper's office: 1 clerk, at \$1,200; 1 clerk, at \$1,000; 1 clerk, at \$720 (submitted) .....	2,920.00		
Navy-yard, Norfolk, Va.: In general storekeeper's office: 1 clerk, at \$1,000; 1 clerk, at \$720 (submitted) ..	1,720.00		
Navy-yard, Mare Island, Cal.: In general storekeeper's office: 1 clerk, at \$1,000; 1 clerk, at \$720 (submitted) ..	1,720.00	\$73,892.03	\$67,532.03
<b>CONSOLIDATING NAVAL SUPPLIES.</b>			
For the completion of the work of arranging, classifying, consolidating, and cataloguing supplies of the navy (act June 30, 1890, vol. 26, p. 205, sec. 1) .....	20,000.00	50,000.00	
And for expenses (not properly chargeable to other specific appropriations) of handling, shipping, and transportation from one station to another, of stores which under the law have ceased to belong to particular bureaus, and have become general supplies for use of the Navy (submitted) .....	30,000.00		

**APPENDIX A.****UNITED STATES NAVY DEPARTMENT.***General financial statement for the fiscal year 1893.***RECEIPTS.**

Balance, June 30, 1891 .....	\$21,705,752.94
Appropriations, act of March 2, 1891 .....	31,353,430.78
Warrant to cover indefinite appropriations, drawn in 1892 .....	216,714.33
Refunded from surplus fund .....	2.00
Interest on Navy pension fund .....	420,000.00
Net amount received from sales of land at Brooklyn, N. Y .....	688,909.11
From insurance by loss by fire at Richmond, Va .....	34,293.82
Sales of condemned stores .....	96,019.57
Recovered from sundry pay officers .....	17,336.35
Rents at Wallabout Bay and Naval Home .....	2,960.74
Supplies sold for cash .....	23,782.46
Received from beneficiaries at Naval Home .....	14,541.05
Premiums on exchange and interest received .....	20,353.54
Collected from contractors in default .....	3,143.11
Sale of effects of deserters and deceased men .....	2,119.43
Sundry repayments .....	7,400.33
<b>Total receipts .....</b>	<b>54,586,759.55</b>

## EXPENDITURES.

Vouchers for specific objects.....	\$9,646,515.28
Labor account at navy-yards and naval stations.....	5,409,829.16
Purchases of supplies in Store X.....	4,692,399.23
Payments at navy-yards and naval stations out of pay of the Navy.....	3,523,386.49
Pay rolls of ships in commission.....	3,360,340.64
Commuted rations.....	687,758.08
Bills paid by pay officers of ships in commission.....	708,573.55
Expended by Marine Corps pay officers.....	848,603.65
Purchase of land for naval station, Puget Sound.....	9,512.00
Sundry expenses at naval station, Puget Sound.....	8,426.90
New naval magazine, Alaska.....	7,732.00
Interest paid on deposits by seamen.....	4,983.01
Discounts on bills of exchange.....	6,526.46
Visitors at Naval Academy.....	1,023.48
Payments for supplies by Navy pay agents, London.....	50,496.61
Expenses of London Navy pay agency.....	4,600.75
Expended by naval attaches in Europe and for students.....	27,592.43
Certificates of Fourth Auditor, paid by pay officers of ships.....	15,388.07
Honorable discharges.....	12,755.00
Expenses of the Navy.....	29,026,442.79
Surplus fund warrant.....	836,727.52
Refunded to the Treasury under the head of Miscellaneous Receipts.....	76,187.77
Secretary of the Interior to pay Navy pensions.....	558,785.00
Expenses of sales at auction.....	3,179.64
Sundry corrections of the balance of 1891.....	77,020.09
Total expenditures.....	30,578,342.81

## RECAPITULATION.

Receipts.....	54,586,759.55
Expenditures.....	30,578,342.81
Balance, June 30, 1892.....	24,008,416.74

*General balance sheet, June 30, 1892.*

## ASSETS.

Balances:	
Appropriations.....	\$23,197,801.20
Pay officers at navy-yard and naval stations.....	296,703.79
Pay officers, ships in Commission.....	557,293.58
Pay officers, Marine Corps.....	25,779.11
Payments to seamen for deposits.....	27,358.26
Deposits in transit.....	52,657.10
Adjustment account.....	2.75
Seligman Brothers, Navy agents, London.....	106,803.92
Advances in transit not credited:	
Pay officers at navy-yards and naval stations.....	227,715.00
Pay officers of ships in commission.....	91,000.00
Seligman Brothers, London.....	250,000.00
Total assets.....	24,833,114.71

## LIABILITIES.

General account of advances.....	307,524.61
Indefinite appropriations.....	17,488.95
Credited in 1892, but drawn in 1893.....	510.05
Vouchers not reported paid.....	235,900.93
Pay of the navy, deposit fund.....	149,381.34
Transfers between pay officers.....	318.16
Bills of exchange not paid.....	41,612.00
Deposits by seamen on interest.....	71,961.84
Commissions on dry docks.....	.09
Total liabilities.....	824,697.97



## RECAPITULATION.

Assets .....	\$24, 833, 114. 71
Liabilities .....	824, 697. 97
Balance to next account .....	<u>24, 008, 416. 74</u>

*Appropriation account for the fiscal year 1892.*

## RECEIPTS.

Balance on hand June 30, 1891 .....	\$20, 259, 110. 06
Appropriated by act of March 2, 1891 .....	31, 333, 430. 78
Refunded from surplus fund .....	2. 00
Covered in by warrant to the credit of the following funds:	
Naval Home, Philadelphia, Pa. ....	71, 215. 00
Clothing and small-store fund .....	341, 763. 03
Naval hospital fund .....	175, 347. 40
Pay of the navy deposit fund .....	186, 429. 50
Ordnance material, proceeds of sales .....	34, 807. 44
Sales of small arms .....	592. 59
Interest on navy pension fund .....	420, 000. 00
Navy-yard, Brooklyn, N. Y., extensions and improvements, act July 2, 1890 .....	593, 860. 33
Refunded by deposits and adjustments .....	<u>1, 627, 965. 65</u>
Total receipts .....	55, 044, 523. 80

## DISBURSEMENTS.

Balance of navy pension fund .....	\$630, 000. 00
Carried to surplus fund .....	358, 967. 24
Requisitions charged to appropriations .....	<u>30, 857, 755. 36</u>
Total disbursements .....	31, 846, 722. 60
Balance of appropriation account, June 30, 1892 .....	<u>23, 197, 801. 20</u>

*Statement of balances.*

Appropriations for fiscal year 1892 .....	\$2, 424, 627. 00
Appropriations for fiscal year 1891 .....	315, 058. 49
Appropriations for fiscal year 1890 .....	331, 214. 55
For preceding years .....	96, 254. 82
Continued appropriations .....	<u>17, 753, 495. 35</u>
	20, 920, 650. 21
And for the following funds:	
Pay of the navy deposit fund .....	149, 381. 34
Pay of Japanese award .....	30, 992. 47
Navy pension fund .....	420, 000. 00
Prize money to captors .....	458, 498. 48
Navy-yard, Brooklyn, extensions and improvements .....	593, 860. 33
Sale of small arms .....	622. 73
Ordnance material, proceeds of sales .....	24, 749. 00
Clothing and small-store fund .....	264, 349. 95
Naval hospital fund .....	<u>334, 696. 69</u>
Balance as above .....	<u>23, 197, 801. 20</u>

*Requisitions drawn by Navy Department during the fiscal year 1892.*

## ANALYSIS.

Advances made to pay officers at shore stations.....	\$23,636,009.81
Advances to pay officers of ships in commission.....	4,076,218.23
Advances to Marine Corps pay officers.....	705,733.12
Advances to Messrs. Seligman Brothers, navy pay agents, London ..	750,000.00
Direct payments by Navy Department.....	75,233.10
Navy Department settlements.....	46,787.36
Lient. A. B. Wychoff, for use at naval station, Puget Sound .....	12,558.00
Paid to miscellaneous receipts.....	16,248.42
Adjustments made by the Fourth Auditor, Treasury Department....	6,613,285.26

Total .....	35,932,073.30
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## Chargeable as follows:

General account of advances.....	5,050,336.83
Indefinite appropriations.....	23,981.11
Appropriation account.....	30,857,755.36

Total as above .....	35,932,073.30
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*Refunding account for the fiscal year 1892.*

Deposits credited .....	\$621,734.99
Navy Department settlements.....	47,883.42
Adjustments made by the Fourth Auditor .....	6,033,190.91

Total .....	6,702,809.32
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## Credited as follows:

General account of advances .....	5,068,351.51
Indefinite appropriations.....	6,492.16
Appropriation account.....	1,627,965.65

Total as above .....	6,702,809.32
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*General Account of Advances.*

Amount carried to surplus fund .....	\$477,760.28
Advanced during the year.....	5,050,336.83

Debits.....	5,528,097.11
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## Credited:

Balance credit June 30, 1891.....	152,220.99
Refunded during the year.....	5,068,351.51

Credits .....	5,220,572.50
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Balance debit, June 30, 1892.....	307,524.61
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*Indefinite appropriations.*

Total amount drawn during year.....	\$23,981.11
Refunded.....	6,492.16

Balance .....	17,488.95
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## Statement:

Indemnity for lost clothing .....	7,329.32
Extra pay to officers and men who served in the Mexican war...	1,525.50
Relief of sufferers by wreck of United States steamers at Apia, Sainoa .....	8,478.13
Relief of sufferers by wreck of U. S. S. <i>Huron</i> .....	156.00

To be covered by warrant for this amount from the Treasury..	17,488.95
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*Payments for labor at navy-yards and naval stations.*

Navy-yard, Portsmouth, N. H. ....	\$272, 853. 07
Navy-yard, Boston .....	290, 830. 52
Naval torpedo station, Newport, R. I. ....	42, 496. 71
Naval training station, Newport, R. I. ....	5, 159. 47
Naval station, New London .....	11, 989. 43
Navy-yard, New York .....	1, 809, 156. 59
Navy-yard, League Island, Pa. ....	226, 771. 90
Naval Home, Philadelphia, Pa. ....	20, 384. 57
Naval Academy, Annapolis .....	45, 734. 57
Naval Academy, pay of professors and others .....	104, 041. 88
Navy-yard, Washington .....	1, 033, 932. 42
Navy-yard, Norfolk .....	942, 967. 70
Naval station, Port Royal, S. C. ....	7, 989. 82
Naval station, Key West .....	8, 299. 58
Navy-yard, Pensacola .....	28, 208. 87
Navy-yard, Mare Island, Cal. ....	559, 012. 03
<b>Total</b> .....	<b>5, 409, 829. 16</b>

*Deposits by seamen on interest.*

Deposited during the year 1892 .....	\$152, 712. 00
Interest paid year 1892 .....	4, 983. 01

## STATEMENT.

Balance in Treasury to credit of pay of the Navy, deposit fund .....	\$149, 381. 34
Deposits not covered into the Treasury .....	71, 961. 84
	<b>221, 343. 18</b>
Less payments made and not charged on books of the Treasury .....	27, 358. 26
<b>Balance, credit</b> .....	<b>193, 984. 94</b>

*Appropriations for the fiscal year 1892, act of July 19, 1892.*

Special course, Naval Academy, 1893 .....	\$5, 000. 00
Repairs, Naval Academy, 1893 .....	21, 000. 00
Heating and lighting, Naval Academy, 1893 .....	17, 000. 00
Contingent, Naval Academy, 1893 .....	41, 800. 00
Transportation, recruiting and contingent, navigation, 1893 .....	40, 000. 00
Gunnery exercises, 1893 .....	6, 000. 00
Ocean and lake surveys .....	14, 000. 00
Outfits for naval apprentices .....	30, 000. 00
Naval training station, 1893 .....	18, 000. 00
Naval War College and Torpedo School, 1893 .....	8, 000. 00
Ordnance and ordnance stores, 1893 .....	155, 000. 00
Repairs, Ordnance, 1893 .....	30, 000. 00
Torpedo station, 1893 .....	60, 000. 00
Civil establishment, Ordnance, 1893 .....	26, 824. 00
Contingent, Ordnance, 1893 .....	8, 000. 00
Naval proving ground .....	25, 000. 00
Arming and equipping naval militia .....	25, 000. 00
Equipment of vessels, 1893 .....	925, 000. 00
Civil establishment, Equipment, 1893 .....	19, 026. 00
Contingent, Equipment, 1893 .....	12, 000. 00
Maintenance, Yards and Docks, 1893 .....	230, 000. 00
Civil establishment, Yards and Docks, 1893 .....	61, 380. 69
Contingent, Yards and Docks, 1893 .....	15, 000. 00
Repairs and preservation, navy-yards, 1893 .....	575, 000. 00
Navy-yard, Portsmouth, N. H. ....	13, 500. 00
Navy-yard, Brooklyn, N. Y. ....	35, 000. 00
Navy-yard, League Island, Pa. ....	43, 600. 00

Navy yard, Washington, D. C. ....	\$15,000.00
Navy-yard, Norfolk, Va. ....	31,500.00
Navy-yard, Mare Island, Cal. ....	18,800.00
Construction of dock, Port Royal, S. C. ....	156,500.00
New Naval Observatory .....	17,500.00
Medical department, Medicine and Surgery, 1893 .....	55,000.00
Repairs, Medicine and Surgery, 1893 .....	20,000.00
Contingent, Medicine and Surgery, 1893 .....	25,000.00
Naval Hospital fund .....	20,000.00
Provisions, Navy, 1893 .....	1,090,000.00
Civil establishment, Supplies and Accounts, 1893 .....	67,532.03
Contingent, Supplies and Accounts, 1893 .....	40,000.00
Construction and Repair, 1893 .....	950,000.00
Civil establishment, Construction and Repair, 1893 .....	19,972.50
Steam machinery, 1893 .....	650,000.00
Civil establishment, Steam Engineering, 1893 .....	11,900.00
Contingent, Steam Engineering, 1893 .....	1,000.00
Machinery plant, navy-yard, League Island .....	25,000.00
Increase of the Navy, armor and armament .....	2,000,000.00
Increase of Navy, equipment .....	400,000.00
Increase of Navy, traveling cranes .....	60,000.00
Increase of the Navy, construction and machinery .....	7,000,000.00
Pay of the Navy, 1893 .....	7,300,000.00
Pay, miscellaneous, 1893 .....	240,000.00
Contingent, Navy, 1893 .....	7,000.00
International naval review .....	50,000.00
Pay Marine Corps, 1893 .....	687,540.85
Provisions, Marine Corps, 1893 .....	71,188.63
Clothing, Marine Corps, 1893 .....	75,000.00
Fuel, Marine Corps, 1893 .....	19,500.00
Military stores, Marine Corps, 1893 .....	13,286.50
Transportation and recruiting, Marine Corps, 1893 .....	14,000.00
Repairs of barracks, Marine Corps, 1893 .....	16,512.00
Forage, Marine Corps, 1893 .....	2,800.00
Hire of quarters, Marine Corps, 1893 .....	6,624.00
Contingent, Marine Corps, 1893 .....	27,500.00
Marine barracks, Port Royal, S. C. ....	3,000.00
Pay, Naval Academy, 1893 .....	104,265.45
By deficiency act, July 28, 1892 .....	148,461.53
Naval coasting stations, sundry civil act, August 5, 1892 .....	250,000.00
<b>Total appropriations .....</b>	<b>23,871,513.18</b>

*Statement of payments through the Paymaster-General's office, on contract, open purchase, and open contract vouchers during year ending June 30, 1892.*

Bureau.	Contract.	Open purchase.	Open contract.	Total.
Yards and Docks .....	\$734,658.37	\$101,556.08	\$24,592.20	\$860,807.64
Equipment .....	118,753.61	177,407.10	71,802.94	668,023.65
Navigation .....	132,684.59	46,723.98	45,705.64	225,114.21
Ordnance .....	1,686,449.25	764,705.80	61,845.20	2,513,000.25
Construction and Repair .....	770,452.16	143,062.50	9,440.99	922,955.65
Steam Engineering .....	265,638.77	160,962.34	7,173.71	433,714.82
Provisions and Clothing .....	488,199.48	33,487.47	11,400.59	533,177.54
Medicine and Surgery .....	87,609.15	52,859.06	22,439.36	162,908.47
Secretary's office .....	7,911,029.52	1,569.56	106,493.20	8,019,092.28
<b>Total .....</b>	<b>12,495,534.90</b>	<b>1,482,275.69</b>	<b>361,103.92</b>	<b>14,338,914.51</b>

## APPENDIX B.

*Statement of receipts and expenditures of provisions, fiscal year, 1892.*

## RECEIPTS.

<b>Balances July 1, 1891:</b>		
On hand at navy-yards and stations.....	\$67, 172. 53	
On board ships in commission.....	94, 978. 01	
Provisions in transit.....	3, 848. 50	
		<b>\$165, 999. 04</b>
<b>Receipts at navy-yards and stations:</b>		
Purchases.....	155, 993. 06	
Gain on issues.....	922. 16	
Coffee mill (roasted coffee).....	19, 330. 63	
		<b>176, 245. 85</b>
<b>Receipts on board ships:</b>		
Purchases.....	152, 084. 14	
Gain on issues.....	7, 887. 10	
		<b>159, 971. 24</b>
		<b>502, 216. 13</b>

## EXPENDITURES.

<b>Expenditures at navy-yards and stations:</b>		
Expense account (for use).....	\$81. 82	
To other departments.....	6. 46	
Condemned by survey to loss account.....	1, 339. 70	
Loss on issues.....	74. 70	
Condemned by survey to be sold at auction.....	6, 019. 83	
Coffee mill (green coffee).....	19, 330. 63	
		<b>\$26, 853. 14</b>
<b>Expenditures on board ships:</b>		
Issues to crew.....	235, 614. 91	
Issues to marines.....	37, 882. 50	
Issues to supernumeraries (not entitled to pay).....	497. 31	
Water for cooking and drinking purposes.....	7, 901. 40	
To other departments.....	263. 89	
Sales to messes for cash.....	10, 557. 52	
Condemned by survey to loss account.....	4, 319. 46	
Loss on issues.....	8, 237. 04	
Loss by wreck (U. S. S. <i>Despatch</i> ).....	100. 16	
		<b>305, 374. 19</b>
<b>Balances, July 1, 1892:</b>		
On hand at navy-yards and stations.....	85, 380. 59	
On board ships in commission.....	73, 789. 50	
Provisions in transit.....	10, 818. 71	
		<b>169, 988. 80</b>
		<b>502, 216. 13</b>

*Provisions in transit June 30, 1892.*

## EXPENDITURES.

<b>Third quarter:</b>		
From A. S. Kenny, general storekeeper, navy-yard, New York, to L. G. Billings, U. S. S. <i>Philadelphia</i> .....		<b>\$43. 08</b>
From W. B. Wilcox, U. S. S. <i>Tallapoosa</i> , to A. S. Kenney, general storekeeper, navy-yard, New York.....		<b>93. 34</b>
<b>Fourth quarter:</b>		
From A. S. Kenny, general storekeeper, navy-yard, New York—		
To E. N. Whitehouse, U. S. S. <i>Chicago</i> .....	3. 29	
To R. P. Lisle, U. S. S. <i>St. Louis</i> .....	2. 01	
To Geo. W. Beaman, general storekeeper, navy-yard, Mare Island....	961. 72	
To Rufus Parks, general storekeeper, navy-yard, Boston.....	1, 504. 81	

## Fourth quarter—Continued.

From Geo. W. Beaman, general storekeeper, navy-yard, Mare Island—	
To F. T. Arms, U. S. S. <i>Ranger</i> .....	\$2,890.30
To M. C. McDonald, U. S. S. <i>Adams</i> .....	2,766.06
To J. C. Sullivan, U. S. S. <i>Mohican</i> .....	2,500.74
From Jas. A. Ring, U. S. S. <i>Constellation</i> , to A. S. Kenny, general store- keeper, navy-yard, New York .....	53.36
Total .....	<u>10,818.71</u>

*Clothing and small stores fund account.*

## RECEIPTS.

Clothing and small stores fund, July 1, 1891 .....	\$1,150,031.31
Accounts receivable subject to settlement by the Fourth Auditor .....	329,481.72
Clothing and small stores purchased:	
Purchased at navy-yards and stations .....	\$288,981.31
Purchased by pay officers on ships .....	4,777.47
Purchased by pay officers on ships (by Fourth Auditor's adjustments) .....	303.28
Pay roll at clothing factory (manufacturing) .....	33,613.68
	<u>327,675.74</u>
Gains:	
Profit and loss .....	1,786.55
Gain on average cost prices .....	1,898.24
Gain by 5 per cent addition to invoice prices .....	15,524.72
Gain on issues .....	760.94
Gain by Fourth Auditor's settlements .....	2.97
	<u>19,973.42</u>
	<u>1,827,162.19</u>

## EXPENDITURES.

Payments made for purchases in 1892 .....	349,450.71
Less due for purchases in 1891 .....	32,154.80
	<u>317,295.91</u>
Payment made by cancellation of reservation bills .....	19.11
Total settlements .....	317,315.02
Due for purchases made in 1892 .....	10,360.72
	<u>327,675.74</u>

## Clothing and small stores expended:

Issued to officers, crew, and marines .....	281,415.05
Clothing outfits to apprentices as bounty (1892) .....	36,526.48
Sold to other departments .....	4,793.41
Sold for cash .....	6,746.78
	<u>329,481.72</u>

## Losses:

Issued to distressed seamen .....	4.17
Issued to supernumeraries not entitled to pay .....	3.20
Expense account .....	50.04
Loss by sales at public auction .....	28,406.31
Loss by condemnations by surveys .....	1,716.45
Loss by wreck (U. S. S. <i>Despatch</i> ) .....	1,366.41
	<u>31,546.58</u>

Clothing and small stores fund, July 1, 1892 .....	1,138,458.15
	<u>1,827,162.19</u>

*Statement of clothing and small stores fund for the fiscal year ending June 30, 1892.*

## ASSETS AND LIABILITIES, JUNE 30, 1892.

## Cash accounts:

Balance in Treasury to credit of fund.....	\$264,349.95	
Balance in hand of paymaster at navy-yard, New York.....	390.81	
		\$264,740.76

## Stock accounts:

On hand at navy-yards and stations.....	372,428.69	
On hand at clothing factory.....	11,428.82	
On hand condemned to be sold.....	15,289.00	
On board ships in commission.....	289,497.00	
Stores in transit.....	28,705.01	
		717,348.52

## Accounts receivable:

For issues and sales awaiting adjustment by the Fourth Auditor.....	154,772.28	
Clothing outfits issued to apprentices upon enlistment prior to July 1, 1890 (act approved March 2, 1889).....	11,907.99	
Deficits in pay officers' accounts.....	49.32	
		166,729.59

Total assets.....	1,148,818.87
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## LIABILITIES.

Due for unpaid bills for stores delivered.....	7,871.76	
Due for reservations unpaid.....	2,037.51	
Due for unpaid ship's bills.....	448.45	
		10,360.72

Clothing and small stores fund, June 30, 1892.....	1,138,458.15
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*Statement of purchases and payments.*

## PURCHASES.

Due for clothing and small stores, July 1, 1891:		
At navy-yards and stations.....	\$31,435.22	
On board ships.....	719.58	
		\$32,154.80
Due for purchases in fiscal year 1892:		
At navy-yards and stations.....	288,981.31	
On board ships.....	4,777.47	
On board ships (adjustments by Fourth Auditor).....	303.28	
		294,062.06
Total purchases.....		326,216.86

## PAYMENTS.

## Payments made for clothing and small stores during fiscal year 1892:

At navy-yard and stations.....	310,485.15	
On board ships.....	5,048.60	
On board ships (adjustments by Fourth Auditor).....	303.28	
Reservations canceled and credited to fund.....	19.11	
		315,856.14
Balance due on clothing and small stores:		
At navy-yards and stations.....	9,912.27	
On board ships.....	448.45	
		10,360.72

Total payments.....	326,216.86
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*Clothing and small stores in transit June 30, 1892.*

## EXPENDITURES.

## Third quarter, 1892:

From George W. Beaman, general storekeeper, navy-yard, Mare Island, Cal.—	
To R. T. M. Ball, U. S. S. <i>Patos</i> .....	\$1,027.83
From W. B. Wilcox, U. S. S. <i>Tallapoosa</i> —	
To A. S. Kenny, general storekeeper, navy-yard, New York .....	1,961.08

## Fourth quarter, 1892:

From Rufus Parks, general storekeeper, navy-yard, Boston, Mass.—	
To A. S. Kenny, general storekeeper, navy-yard, New York .....	7,117.93
From A. S. Kenny, general storekeeper, navy-yard, New York—	
To H. T. Wright, U. S. Coast Survey vessels .....	178.04
To J. A. Smith, general storekeeper, navy-yard, Washington, D. C. ....	6,427.68
To Rufus Parks, general storekeeper, navy-yard, {	1,827.11
Boston, Mass. ....	1,598.39
	3,425.53

From George W. Beaman, general storekeeper, navy-yard, Mare Island, Cal.—	
To F. T. Arms, U. S. S. <i>Ranger</i> .....	551.52
To M. C. McDonald, U. S. S. <i>Adams</i> .....	842.26
To R. T. M. Ball, U. S. S. <i>Patos</i> .....	138.50
To J. C. Sullivan, U. S. S. <i>Mohican</i> .....	435.58
To L. C. Kerr, U. S. S. <i>Alert</i> .....	168.84
To H. G. Colby, U. S. S. <i>Marion</i> .....	1,305.45
To T. J. Cowie, U. S. S. <i>Petrel</i> .....	2,008.20
To L. A. Frailey, U. S. S. <i>Lancaster</i> .....	2,417.45
From L. G. Billings, U. S. S. <i>Philadelphia</i> —	
To A. S. Kenny, general storekeeper, navy-yard, New York .....	699.12
Total .....	28,705.01

*Statement of receipts and expenditures of contingent stores, fiscal year 1892.*

## RECEIPTS.

Balance July 1, 1891:	
On hand at navy-yards and stations .....	\$12,727.61
On board ships in commission .....	16,564.39
Contingent stores in transit .....	402.07
	\$29,694.07
Receipts at navy-yards and stations:	
Purchases .....	23,964.70
Gain on issues .....	324.27
Miscellaneous (sets of stationery) .....	939.49
From other departments .....	177.66
	25,406.12
Receipts on board ships:	
Purchases .....	1,258.19
Gain on issues .....	108.06
Miscellaneous .....	155.21
	1,521.46
Total .....	56,621.65

## EXPENDITURES.

## Expenditures at navy-yards and stations:

For use .....	16,879.07
Issues to other departments .....	533.21
Condemned by survey to loss account .....	166.19
Loss on issues .....	.30
Miscellaneous (from stock, into sets of stationery) .....	939.49
Condemned to be sold at auction .....	1,356.33
	19,874.59



**Expenditures on board ships:**

Issued to ships' use.....	\$5,946.64	
Issued to other departments .....	345.76	
Condemned by survey to loss account .....	101.51	
Loss on issues .....	.36	
Loss by wreck (U. S. S. <i>Dispatch</i> ) .....	59.16	
		<u>\$6,453.43</u>

**Balances July 1, 1892:**

On hand at navy-yards and stations .....	\$15,739.49	
On board ships in commission .....	14,230.72	
Contingent stores in transit .....	323.42	
		<u>\$30,293.63</u>

Total .....	<u><u>56,621.65</u></u>
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*Contingent stores in transit June 30, 1893.***EXPENDITURES.****Third quarter:**

From W. B. Wilcox, U. S. S. <i>Tallapoosa</i> —	
To A. S. Kenny, general storekeeper, navy-yard, New York.....	\$190.26

**Fourth quarter:**

From J. A. Smith, general storekeeper, navy-yard, Washington, D. C.—	
To George W. Beaman, general storekeeper, navy-yard, Mare Island .....	32.93
To A. S. Kenny, general storekeeper, navy-yard, New York..	18.75
From A. S. Kenny, general storekeeper, navy-yard, New York—	
To J. A. Smith, general storekeeper, Washington, D. C .....	69.72
From George W. Beaman, general storekeeper, navy-yard, Mare Island—	
To F. T. Arms, U. S. S. <i>Ranger</i> .....	30.51

Total .....	<u><u>342.17</u></u>
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**RECEIPTS.****Fourth quarter:**

To John Furey, U. S. S. <i>Vermont</i> —	
From A. S. Kenny, general storekeeper, navy-yard, New York..	18.75

Net balance .....	323.42
Total .....	<u><u>342.17</u></u>

## APPENDIX C.

## TITLE A.—SHIPS' COST AND VALUATION.

Vessels.	Money vouchers.	Labor.	Material.	Total.
Newark	\$25,919.12	\$1,486.66		\$27,405.78
Maine	174,060.64	206,110.99	\$69,583.09	569,754.72
Texas	163,826.11	271,994.41	139,546.58	575,367.10
Puritan		132,489.30	34,125.71	166,615.01
Monadnock		102,782.99	46,804.29	149,587.28
Amphitrite	27.81	124,100.16	45,187.33	169,315.30
Terror		85,723.20	14,652.88	100,376.08
Philadelphia		528.66		528.66
San Francisco		1,101.07	577.69	1,678.76
Concord	8,229.89	190.89	88.84	8,509.62
Bennington	37,188.97	16,998.46	8,618.62	62,806.05
Miantonomoh	1,414.73	53,360.90	8,227.63	63,003.26
Monterey	453,591.59	9,184.26		462,775.85
New York	897,700.00	27,817.69		925,517.69
Cruiser No. 6	700,440.00	9,378.96		709,818.96
Cincinnati		410,784.90	159,879.37	570,664.27
Raleigh	1,463.61	405,810.12	181,940.40	589,214.13
Montgomery	178,727.00	9,409.03	711.70	188,847.73
Detroit	178,727.00	9,723.24	1,865.12	190,315.36
Cruiser No. 11	185,782.18	12,097.78	1,250.05	199,070.01
Bancroft	147,575.00	12,502.72	1,941.51	162,019.23
Torpedo cruiser		426.00		426.00
Destroyer	6,617.75	1,653.45		8,271.20
Torpedo boat No. 2		4,553.00		4,553.00
Machias (gun boat No. 5)	117,891.23	8,599.82	922.17	127,413.22
Castine (gun boat No. 6)	117,891.23	8,808.02	1,188.96	127,888.21
Harbor defense ram	292,950.66	7,643.92	104.47	300,698.39
Indiana	918,900.00	8,517.23		927,417.23
Massachusetts	918,900.00	9,258.34		928,158.34
Oregon	773,474.40	10,446.17		783,920.57
Cruiser No. 12	1,144,500.60	17,299.44		1,161,799.44
Cruiser No. 13	564,900.00	8,568.87		573,468.87
Wahnetta	21,125.32	274.69	116.28	21,516.29
Iwana	20,560.32	344.93	123.09	21,028.34
Narkeeta	21,306.98	743.74	119.62	22,170.34
Total	8,073,690.88	2,050,624.01	717,575.40	10,841,890.30

## TITLE B.—EQUIPAGE.

Newark	\$8,357.52			\$8,357.52
Charleston	990.39		\$134.16	1,124.55
Yorktown	391.51			391.51
Baltimore	742.86			742.86
Vesuvius	246.43	\$721.07	18.52	966.02
Maine		139.32	7.88	147.20
Cushing	8.30	100.28	7.32	115.90
Philadelphia	1,261.34			1,261.34
San Francisco	749.13		128.19	877.32
Concord	5,558.18		66.14	5,624.32
Bennington	12,073.56	1,090.27	364.95	13,528.78
Miantonomoh	20,916.43	11,302.74	1,107.44	33,326.61
Monterey		87.88	2.30	90.18
New York			3,069.44	3,069.44
Cincinnati		238.28	24.37	262.65
Raleigh		658.48	61.28	719.76
Montgomery			317.63	317.63
Detroit		58.56	279.04	337.60
Cruiser No. 11			276.39	276.39
Machias		44.47		44.47
Castine		46.64		46.64
Narkeeta			2,240.58	2,240.58
Wahnetta			2,242.07	2,242.07
Iwana			126.03	126.03
Chicago	261.00			261.00
Lancaster	133.00		.50	133.50
Pensacola	20.05			20.05
Atlanta	3.25			3.25
Boston	1.80			1.80
Dolphin	754.01			754.01
Thetis	4.00			4.00
Constellation	5.97			5.97
Portsmouth	39.00			39.00
Despatch	.81			.81
Total	52,518.54	14,487.99	10,474.23	77,480.76

## REPORT OF THE SECRETARY OF THE NAVY.

## TITLE C.—COST OF COMMISSION.

Vessels.	Money vouchers.	Labor.	Material.	Total.
Enterprise.....	\$30.00			\$30.00
Minnesota.....	180.00			180.00
Philadelphia.....	95.00			95.00
Yorktown.....	116.50			116.50
Jamestown.....	146.25			146.25
Bennington.....	15.00			15.00
Chicago.....	15.00			15.00
Concord.....	15.00			15.00
Kearsarge.....	15.00			15.00
Portsmouth.....	106.25			106.25
Vesuvius.....	15.00			15.00
Newark.....	76.25			76.25
Dolphin.....	50.00			50.00
Adams.....	56.80			56.80
Thetis.....	225.65			225.65
Total.....	1,157.70			1,157.70

## TITLE D.—SHIPS' REPAIRS.

Newark.....	\$687.16	\$11,029.82	\$6,288.07	\$18,005.05
Charleston.....		6,240.54	2,481.66	8,722.20
Yorktown.....	1,464.65	6,051.59	4,165.27	12,081.51
Petrel.....		8,386.24	1,540.53	9,926.77
Baltimore.....	3.50	18,772.63	14,810.61	33,586.74
Vesuvius.....	49.00	4,580.81	1,338.06	5,967.87
Cushing.....		6,752.47	84.06	6,836.52
Puritan.....			27	27
Philadelphia.....	688.37	24,391.26	9,337.15	34,416.78
San Francisco.....	18.55	11,985.19	2,569.71	14,573.45
Concord.....	34.00	6,778.52	1,589.13	8,401.65
Bennington.....		856.43	519.45	1,375.88
Miantonomoh.....		209.46	73.85	283.31
Destroyer.....		104.48		104.48
Chicago.....	24.75	12,864.02	15,512.32	28,401.09
Lancaster.....	2.00		24.83	26.83
Pennsacola.....		2,540.40	277.60	2,818.00
Atlanta.....	235.65	11,536.10	3,014.39	14,786.14
Boston.....		19,869.48	6,265.57	26,135.05
Hartford.....			6.49	6.49
Richmond.....	1,260.00			1,260.00
Omaha.....	81.00	709.23	51.50	841.73
Ajax.....		52.98		52.98
Mahopac.....			1.45	1.45
Wyandotte.....		486.06		486.06
Camanche.....		1,623.79	464.49	2,088.28
Montauk.....			278.00	278.00
Nantucket.....		7,679.91	1,611.90	9,291.81
Passaic.....		7,331.15	1,763.00	9,114.15
Swatara.....		362.88	77.41	440.29
Galena.....			70.14	70.14
Marion.....			750.13	750.13
Mohican.....	2.00	3,190.38	1,462.68	4,654.96
Iroquois.....		11.16		11.16
Kearsarge.....		3,418.21	1,205.04	4,623.25
Dolphin.....	53.63	33,782.23	9,464.06	43,300.92
Adams.....		44,911.18	10,462.19	55,373.37
Enterprise.....		5.04	1.92	6.96
Nipsic.....		6,910.82	1,274.18	8,185.00
Thetis.....	68.50	3,014.87	1,404.11	4,487.48
Alert.....			752.98	752.98
Ranger.....		57,248.85	17,428.22	74,677.07
Yantic.....		3,531.28	674.45	4,205.73
Alarm.....		449.67	25.09	474.76
Fern.....		7,772.57	3,517.37	11,289.94
Despatch.....		322.52	52.12	374.64
Catalpa.....		1,149.02	77.86	1,226.88
Fortune.....		731.13	418.82	1,149.95
Leyden.....		1,547.23	1,324.82	2,872.05
Mayflower.....		273.81		273.81
Ivy.....		105.66		105.66
Rocket.....		351.68		351.68
Nina.....		1,460.53	360.37	1,820.90
Standish.....		8.10	4.80	12.90
Triton.....		1,643.03	351.52	1,994.55
Vermont.....		2,672.67	757.12	3,429.79
Independence.....		277.18	194.48	471.66
Constitution.....		238.67	13.15	251.82

## BUREAU OF SUPPLIES AND ACCOUNTS.

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## TITLE D.—SHIPS' REPAIRS—Continued.

Subtitle.	Money vouchers.	Labor.	Material.	Total.
Monongahela .....	\$37.82	\$2,995.63	\$874.83	\$3,908.28
Constellation .....	48.70	2,380.79	496.55	2,926.04
Jamestown .....	14.75	8,543.66	2,474.47	11,032.88
Portsmouth .....		4,002.07	1,929.07	5,931.14
Saint Mary's .....			7.90	7.90
Dale .....		581.91	201.99	783.94
Franklin .....	34.99	898.37	1,272.55	2,205.91
Minnesota .....		850.36	88.65	939.01
Wabash .....		82.69	26.27	108.95
Albatross .....		2,358.50	274.22	2,632.72
Wyoming .....			3.96	3.96
Wahnetta .....		42.88		42.88
Narkeeta .....		839.83	285.66	1,125.49
Total .....	4,809.02	369,895.70	136,135.32	510,840.04

## TITLE E.—REAL ESTATE AND CHATTELS.

Navy-yard, Portsmouth .....	\$13,607.01	\$21,528.92	\$48,383.23	\$83,519.16
Navy-yard, Boston .....	48,695.00	5,365.91	5,223.98	59,284.89
Torpedo station, Newport .....			6,176.66	6,176.66
Naval training station, Newport .....	334.50			334.50
Naval war college .....	80,149.10			80,149.10
Naval station, New London .....			1,713.20	1,713.20
Navy-yard, League Island .....	118,631.75	32,769.20	7,314.80	158,715.75
Navy-yard, New York .....	43,376.00	87,274.25	124,806.73	255,456.98
Naval Academy, Annapolis .....	14,686.72		18,284.93	32,971.65
Navy-yard, Washington .....	24,804.78	15,122.54	19,808.24	59,735.56
New Naval Observatory .....	111,085.03			111,085.03
Naval proving ground .....	4,296.25	10,107.51	6,004.41	20,408.17
Navy-yard, Norfolk .....	32,599.22	30,749.51	23,425.97	86,774.70
Naval station, Port Royal .....	129,794.13	5,241.58	5,189.26	140,224.97
Naval station, Key West .....			550.00	550.00
Navy-yard, Pensacola .....			651.70	651.70
Navy-yard, Mare Island .....	12,120.01	31,456.50	45,548.12	89,124.63
New Naval Magazine, Dover .....	37,419.24	5,273.14	64.00	42,756.38
Naval Hospital, Mare Island .....	4,693.50			4,693.50
Total .....	676,292.24	244,889.06	313,145.23	1,234,326.53

## TITLE F.—MACHINERY PLANT.

Navy-yard, Portsmouth:				
Bureau Yards and Docks .....			\$371.17	\$371.17
Bureau Construction and Repair .....		\$193.10	33,213.92	33,407.02
Bureau Steam Engineering .....		5,773.67	2,446.23	8,219.90
Navy-yard, Boston:				
Bureau Yards and Docks .....			122.00	122.00
Bureau Equipment .....			3,668.75	3,668.75
Bureau Construction and Repair .....		40,059.59	25,027.05	65,086.64
Bureau Steam Engineering .....	\$539.00	4,803.94	41,593.19	46,936.13
Torpedo Station, Newport:				
Bureau Ordnance .....			1,802.24	1,802.24
Navy-yard, New York:				
Bureau Construction and Repair .....		11,451.48	15,153.15	26,604.63
Bureau Steam Engineering .....		14,361.07	41,791.30	56,152.97
Navy-yard, League Island:				
Bureau Construction and Repair .....		3,065.82	40,612.19	43,678.01
Naval Academy, Annapolis:				
Bureau Steam Engineering .....			783.11	783.11
Bureau Navigation .....			3,404.41	3,404.41
Navy-yard, Washington:				
Bureau Ordnance .....	332,077.03		152,890.57	484,967.60
Naval proving ground:				
Bureau Ordnance .....			533.89	533.89
Navy-yard, Norfolk:				
Bureau Construction and Repair .....			21,404.67	21,404.67
Navy-yard, Mare Island:				
Bureau Construction and Repair .....		11,226.10	61,623.71	72,849.81
Bureau Steam Engineering .....		5,664.27	39,163.96	44,828.23
Total .....	332,616.03	96,593.14	485,605.51	914,814.68

## TITLE G.—GENERAL MAINTENANCE.

Sub-title.	Money vouchers.	Labor.	Material.	Total.
Navy-yard, Portsmouth	\$611.32	\$102,429.95	\$22,393.75	\$125,435.02
Navy-yard, Boston	9,246.72	114,911.22	43,174.40	167,332.34
Naval magazine, Chelsea	769.60			769.60
Niter depot, Malden	208.01	25.00		233.01
Torpedo station, Newport	947.97	37,131.01	19,744.98	57,823.96
Training station, Newport	877.84	5,159.47	8,963.47	10,000.78
Naval War College, Newport	307.83			307.83
Naval station, New London	2,646.57	11,989.93	2,899.48	18,505.98
Naval magazine, Fort Wadsworth	150.00			150.00
Navy-yard, New York	15,982.06	282,385.47	115,761.02	414,128.55
Navy-yard, League Island	4,553.54	140,135.36	44,010.65	188,699.55
Naval Home, Philadelphia	46,506.78	17,140.57		63,647.35
Naval Academy, Annapolis	1,754.54	143,586.58	61,283.86	206,624.98
Naval ordnance proving ground		6,103.87	948.48	7,052.35
Navy-yard, Washington	3,056.83	156,849.34	23,595.51	183,501.68
Naval magazine, Bellevue	10.00	1,747.24		1,757.24
Navy-yard, Norfolk	2,795.94	148,568.84	80,850.98	230,015.06
Naval station, Port Royal	1,551.37	2,748.24	887.08	5,186.69
Naval station, Key West	2,254.25	8,299.58	475.87	11,029.70
Navy-yard, Pensacola	259.54	27,533.27	6,626.59	34,419.40
Navy-yard, Mare Island	6,033.98	167,611.62	86,928.55	260,572.15
Naval hospital, Widows Island	507.86	1,079.00		1,586.86
Naval hospital, Portsmouth	8,430.57	218.75		8,649.32
Naval hospital, Chelsea	12,235.11	3,295.89		15,531.00
Naval hospital, New York	27,000.23	5,857.48		32,857.71
Naval laboratory, New York	24,930.32	3,900.00		28,830.32
Naval hospital, Philadelphia	15,408.43	3,244.00		18,652.43
Naval hospital, Washington	5,554.25	2,059.00		7,613.25
Naval dispensary, Washington	3,045.45			3,045.45
Museum of Hygiene, Washington	4,936.73	1,220.00		6,156.73
Naval hospital, Norfolk	17,397.48	4,832.09		22,229.57
Naval hospital, Pensacola	2,902.50	495.00		3,397.50
Naval hospital, Mare Island	13,230.26	4,623.15		17,853.41
Sacketts Harbor, New York	394.50			394.50
Erie, Pa.	536.00			536.00
Hydrographic Office	12,797.66			12,797.66
Naval magazine, Craney Island	15,420.38	181.22		15,601.60
Naval proving ground, Indian Head	79.00	11,479.66	4,281.00	15,839.66
Naval station, Puget Sound	82.00		77.38	159.38
Total	265,473.42	1,414,832.80	518,070.90	2,198,377.12

## TITLE Z.—CONVERSION ACCOUNT.

Bureau of Yards and Docks:				
Navy-yard, Washington		\$79.68	\$32.28	\$111.96
Navy-yard, Norfolk			2.00	2.00
Bureau of Equipment:				
Navy-yard, Portsmouth		7,033.33	2,865.33	9,898.66
Navy-yard, Boston		91,951.84	52,086.13	144,037.97
Navy-yard, New York		26,688.42	38,054.99	64,743.41
Navy-yard, Washington		171.73	48.10	219.83
Navy-yard, Norfolk		6,589.27	6,954.82	13,544.09
Navy-yard, Mare Island		19,488.39	37,333.96	56,822.35
Bureau of Ordnance:				
Navy-yard, Portsmouth		190.28	2,071.63	2,261.91
Navy-yard, Boston			209.47	209.47
Torpedo station		5,020.76	14,265.83	19,276.59
Navy-yard, New York		2,252.22	18,075.45	20,327.67
Navy-yard, League Island		249.70		249.70
Navy-yard, Washington		653,026.71	800,850.18	1,513,885.89
Navy-yard, Norfolk		211.97	6,040.02	6,251.99
Navy-yard, Mare Island		5,346.25	183,429.42	188,775.67
Bureau of Construction and Repair:				
Navy-yard, Portsmouth		54,596.22	14,610.85	69,207.07
Navy-yard, Boston		10,734.08	3,884.92	14,619.00
Navy-yard, New York		60,086.52	18,713.05	78,799.57
Navy-yard, Washington		573.45	40.00	613.45
Navy-yard, Norfolk		21,008.31	6,014.14	27,022.45
Navy-yard, Mare Island		2,092.01	1,637.48	3,729.49
Bureau of Steam Engineering:				
Navy-yard, Portsmouth		37,052.47	6,791.93	43,844.40
Navy-yard, New York		14,506.73	11,095.03	25,601.76
Navy-yard, Norfolk		10,335.50	7,773.05	18,108.55
Navy-yard, Mare Island		6,502.37	3,613.09	10,115.46
Bureau of Provisions and Clothing:				
Navy-yard, New York	\$4,155.82	33,618.68	74,518.07	112,292.57
Total	4,155.82	1,089,401.89	1,871,018.92	2,444,576.63

## TITLE X.—SUPPLIES IN STORE.

Bureaus.	Money vouchers.	Labor.	Material.	Total.
Yards and Docks .....	\$401,342.96	.....	.....	\$401,342.96
Equipment .....	484,825.50	.....	.....	484,825.50
Navigation .....	87,286.97	.....	.....	87,286.97
Ordnance .....	1,852,467.13	.....	.....	1,852,467.13
Construction and Repair .....	906,152.14	.....	.....	906,152.14
Steam Engineering .....	418,494.92	.....	.....	418,494.92
Provisions and Clothing .....	506,829.61	.....	.....	506,829.61
Secretary's office .....	35,000.00	.....	.....	35,000.00
	4,692,399.23	.....	.....	4,692,399.23

## RECAPITULATION.

Title A.—Cost and valuation of ships .....	\$8,073,690.88	\$2,050,624.01	\$717,575.40	\$10,841,890.30
Title B.—Equipage .....	52,518.54	14,487.99	10,474.23	77,480.76
Title C.—Cost of commission .....	1,157.70	.....	.....	1,157.70
Title D.—Repairs of vessels .....	4,809.02	369,895.70	136,135.32	510,840.05
Title E.—Real estate and chattels .....	676,292.24	244,889.06	313,145.23	1,234,326.53
Title F.—Machinery plant .....	332,616.03	96,593.14	485,605.51	914,814.68
Title G.—General maintenance .....	265,473.42	1,414,832.80	518,670.90	2,198,977.12
Title N.—Experiments, etc .....	10,632.91	30,434.61	23,895.17	64,962.69
Title O.—Naval militia .....	5,460.00	9.12	8,203.04	13,672.16
Title V.—Miscellaneous .....	219,708.72	118,660.84	15,373.75	353,743.31
Title Z.—Conversion account .....	4,155.82	1,069,401.89	1,371,016.92	2,444,574.63
Expended for specific objects, as above .....	9,646,515.28	5,409,829.16	3,600,095.47	18,656,439.91
Title X.—Supplies in store .....	4,692,399.23	.....	.....	4,692,399.23
Total .....	14,338,914.51	5,409,829.16	3,600,095.47	23,348,839.14

## APPENDIX D.

*Statement showing the value of real estate and chattels and machinery plant at the several navy-yards and stations, June 30, 1892.*

Yards and stations.	Real estate and chattels.	Machinery plant.
Navy-yard Portsmouth .....	\$2,809,567.58	\$257,029.76
Navy-yard Boston .....	10,835,247.80	995,962.44
Torpedo station, Newport .....	234,673.76	54,061.72
Training station, Newport .....	241,125.75	6,500.00
Naval War College .....	80,149.10	.....
Naval station, New London .....	126,713.05	6,136.16
Navy-yard, League Island .....	2,736,864.92	163,934.42
Navy-yard, New York .....	12,536,591.42	758,967.39
Naval Academy, Annapolis .....	629,977.59	4,799.93
Navy-yard, Washington .....	4,363,008.26	1,583,289.25
New Naval Observatory .....	475,789.20	.....
Naval proving ground .....	43,893.15	533.89
Navy-yard, Norfolk .....	5,620,385.10	566,044.07
Naval station, Port Royal .....	165,814.03	.....
Naval station, Key West .....	299,586.30	8,291.35
Navy-yard, Pensacola .....	1,885,922.77	45,459.00
Navy-yard, Mare Island .....	4,889,654.59	231,945.71
New naval magazine, Dover .....	42,790.38	.....
	48,017,254.75	4,683,555.29

## APPENDIX E,

*Compilation showing cost of maintaining all naval vessels in commission during year ended June 30, 1892, excepting for medicines.*

Money expended.											
Vessels.	Pay of officers, crew and ma- rines.	Rations, amount com- muted.	Special cred- its: hono- rable discharge money, out- fits to appren- tices, etc.	Incidental expenses: Postage, freight, pilotage, current repairs abroad, etc.						Secretary's office.	
				Bureau Equip- ment.	Navigation.	Ordi- nance.	Construc- tion and Repair.	Steam En- gineering.	Provisions and Cloth- ing.		Medicine and Sur- gery.
Adams	\$19,864.82	\$2,028.50	\$119.17								\$127.05
Albatross (Fish Commission)	38,784.00	5,283.60	405.00	\$471.40	\$232.97		\$129.49		\$1.00	\$14.55	8.90
Alert	66,225.75	8,772.85	867.00	247.55	381.78	\$45.57	109.30	\$177.28	89.70	364.41	740.27
Alliance	77,021.57	10,452.60	1,878.00	247.55	7.50	198.80	1.70	222.58	160.78	690.62	890.29
Atlanta	126,230.05	18,879.30	1,878.00	922.92	474.98	5.30	1,161.41	1.65	51.29	44.56	1,327.46
Baltimore	158,773.38	17,611.03	1,878.00	765.73	474.98	5.30	1,161.41	1.65	408.51	286.86	1,836.51
Bennington	93,241.98	10,892.80	1,388.00	1,551.71	74.61	.98	1.40	838.09	58.53	48.61	1,222.70
Boston	128,500.20	15,507.60	1,388.00	298.18	121.15	4.90	72.95	165.95	41.65	693.67	685.27
Charleston	148,373.83	17,604.60	1,525.31	666.98	146.50		33.25	501.82	32.00	182.54	705.00
Chicago	24,374.40	4,141.33	1,923.00	4,141.33	238.90	.20	.40	226.21	153.34	544.73	1,904.66
Coast Survey Vessels	173,579.99	31,403.10							22.90	352.80	63.62
Concord	91,985.89	11,431.50	414.00	934.48	4.74		10.00	.21	12.36	15.63	67.69
Constellation	35,227.88	6,393.60	120.00	3.20			1.00		8.00	36.06	20.22
Dale (receiving ship)	63,846.68	10,803.08	8,806.42		108.00						
Despatch	9,875.01	1,433.40	422.25	385.00							
Dolphin	15,410.66	3,402.00									
Enterprise	59,556.88	10,843.10	180.40	1.50							
Eseaux	83,325.91	9,848.90	108.00	408.71	1,052.83			4.83	624.67	214.19	559.68
Fern	28,157.68	4,720.50	303.00								
Fish Hawk (Fish Commission)	86,570.74	18,401.40	1,592.69								
Franklin (receiving ship)	99,577.74	25,216.50	11,179.66								
Independence (receiving ship)	86,570.74	18,401.40	1,592.69								
Iroquois	74,677.04	8,504.40	180.00	773.37	180.00				1.90	15.00	87.10
Jamestown	84,257.04	13,439.50	300.08	470.18	470.18	3.45	173.23	8.20	224.28	27.00	107.55
Kearney	85,138.15	13,158.20	442.27	7.05	13.31		74.98		27.66	414.84	181.90
Lancaster	168,792.13	21,726.20	697.00	277.91	167.24	1.50	1.00	20	10.45	15.55	171.01
Marion	101,113.24	15,298.70	822.55	603.18	90.15	126.40	824.97	28.09	201.76	139.74	333.59
Manitowish	83,682.51	4,028.10	841.58	84.17	256.83	28.81	1,991.56	837.40	38.80	54.08	2,001.60
Michigan	90,465.51	11,163.00	2,402.24	14.66	1,853.45	.50	90.60	90.22	15.81	2.50	1.00
Minnesota (receiving ship)	77,462.81	17,164.90	17,164.90	20.39	135.75	2.81	8.47	11.83	30.63	108.91	43.04
Mohican	87,443.07	13,276.60	504.10	1.07	728.09	.76	791.69	1.74	47.23	44.75	64.11
Monitors	23,711.83	6,044.40	91.96	50.00					7.72	4.50	90.95
Monoway	71,073.01	12,428.40	1,307.60	1,917.18	282.19	5.53	1,881.15	46.02	108.01	186.99	831.07
Monongahela	101,623.64	18,877.10	16.33	288.74	288.74	1.55	37.38	2.44	52.61	90.20	408.88
Monongahela	148,907.83	19,113.05	477.00	303.80	327.92		17.92			36.37	623.87

	4,702.40	879.60	64.10	368.43	3.95	2.07	217.27	43.46	8.81	223.47	495.99
New Hampshire (receiving ship)	4,702.40	879.60	64.10	368.43	3.95	2.07	217.27	43.46	8.81	223.47	495.99
Palos	32,194.17	4,853.10	462.00								
Pasado (and Naval Academy vessels)	11,613.31	2,261.10									
Pennacola	106,156.68	12,511.80	123.00	1,297.27	743.79	.85	2.60	16.89	281.08	378.54	461.06
Petrel	61,867.53	8,172.30	1,702.01	739.84	124.53	2.85	623.15	670.16	29.55	48.02	956.77
Philadelphia	179,805.76	18,634.20	570.00	4,220.03	174.25	5.00		1,138.60	51.20	138.05	1,437.23
Pinta	45,448.21	9,924.50	518.42	99.82	475.50	13.60	70.52	72.50	87.30	194.58	1,740.43
Portsmouth	85,045.09	13,001.20	2,535.58	27.60	379.12				43.06	160.30	174.26
Ranger	21,434.69	2,589.00	1.31	45.50	11.00			586.35	20.35	1.10	55.70
Richmond (at training station)	139,955.91	45,758.10	12,349.14		24.50				174.80	749.95	4.20
San Francisco	174,698.32	19,754.70	477.00	1,940.80	609.71	2.15	57.15	420.45	2.80	62.31	1,605.17
St. Louis (receiving ship)	51,508.82	7,357.80	4,240.89	2.15					74.00	8.00	4.25
Tallapoosa	32,677.48	3,821.40	1,008.00	51.95	4,680.10	7.42	16.41	6.41		121.23	4,163.38
Thetis	54,818.43	10,606.50	526.40	188.00	11.95					69.50	32.70
Vermont (receiving ship) and Cushing	168,670.55	33,933.30	12,855.00						17.25	72.57	14.72
Vesuvius	37,865.62	7,325.10	621.00								
Wabash (receiving ship)	80,708.95	14,720.40	5,858.33		11.40				112.76	33.00	
Yantic	61,544.01	6,980.50	2,052.00	489.26	20.74	.47	20	.15	202.99	79.36	
Yorktown	88,402.83	11,042.20	1,907.46	179.98	132.36	7.52	7.58	483.74	85.47	54.57	1,081.34
Total	4,379,293.28	674,130.78	104,940.51	25,207.23	15,005.41	409.07	8,438.62	6,613.47	3,315.12	7,188.82	26,070.47





Pinta.....	7,717.45	218.02	784.17	1,365.09	260.77	110.80	.....	68,108.28	12
Portsmouth.....	7,630.28	1,408.72	832.34	241.68	11,081.68	54.90	5,031.14	129,453.05	12
Ranger.....	4,886.20	95.76	217.95	758.92	1,645.07	312.08	.....	22,061.58	44
Richmond (at training station).....	8,200.47	958.59	2,126.51	3,942.76	186.52	115.32	1,290.00	215,640.97	12
San Francisco.....	47,154.12	7,084.39	3,329.19	11,077.09	21,675.02	446.54	14,573.45	305,140.36	12
St. Louis (receiving ship).....	1,923.58	53.16	165.08	.....	1,032.04	1.81	.....	66,309.96	12
Tallapoosa.....	10,544.66	1,550.70	1,413.67	813.88	2,319.98	165.24	.....	63,435.91	7
Thetis.....	19,258.40	167.49	1,270.55	1,712.76	385.25	1,373.65	4,487.48	94,928.06	12
Vermont (receiving ship) and Cushing.....	10,222.36	783.67	1,563.40	1,547.80	2,212.91	220.69	10,296.31	242,410.52	12
Vesuvius.....	3,643.27	2,096.94	530.57	2,593.54	.....	57.90	5,967.87	60,701.81	12
Wabash.....	4,808.33	1,066.93	450.39	9,419.43	2,878.68	20.70	108.95	119,185.49	12
Yantic.....	4,361.73	1,124.56	950.59	1,105.25	5,507.39	127.24	4,295.73	88,873.93	12
Yorktown.....	23,919.14	4,339.93	1,912.93	6,987.23	8,427.21	388.58	13,631.51	173,041.58	12
Total.....	705,279.34	117,906.27	77,260.31	141,607.32	303,100.45	11,057.91	304,099.37	6,910,893.75	

## APPENDIX F.

*Classified abstract of balance sheets of property returns, naval establishment, at navy-yard, Portsmouth, N H., for year ending June 30, 1892.*

ON HAND JUNE 30, 1892.

Class.	Articles.	Account A, general stock.	Account B, increase of the Navy.	Account C, reserved stores.	Account D, con- demned stores.	Account E, ex- empted stores.	Total.
1	Anchors, anchor gear, and chains.	\$39,893.79		\$76.05	\$1.95		\$39,971.79
2	Apparatus and materials, electric.	173.77			.62		174.39
3	Bags, boxes, and chests.	7,019.42	\$240.06		29.75		7,289.23
4	Blocks, etc.	671.88		108.00	5.20		785.08
5	Bolts, rivets, nuts, lag-screws, and washers.	8,985.07	30.27		12.87		9,029.11
6	Brushes and brooms.	393.00			1.50		394.50
7	Building materials.	6,786.13					6,786.13
8	Canvas, cordage, and rigging.	34,347.21	6,187.65	1,762.91	1,378.02		43,675.79
9	Clothing.	6.67					6.67
10	Dry goods.	1,397.30	73.83		.05		1,471.18
11	Fuel.	10,365.87					10,365.87
12	Furniture and fittings, galley, kitchen, house, and table.	2,088.91		69.50	53.15		2,211.56
13	Glass.	110.52					110.52
14	Hardware.	45,517.38	3,451.26	24.70	48.54		49,041.88
15	Harness and horse furnishings.	10.07					10.07
16	Instruments and apparatus, miscellaneous.	3,466.31			2.00	\$1,753.43	5,221.74
17	Lamps and lamp fixtures.	1,082.11			1.81	1,321.63	2,405.55
18	Leather and belting.	3,196.34	363.79				3,560.13
19	Lumber and timber.	110,335.39	2,834.23				113,169.62
20	Machinery and machine tools.	44,366.91			348.50		44,715.41
21	Metals.	145,918.92	269.00		747.61		146,935.53
22	Ordnance materials.	380,365.71		462.84	2,388.34		383,216.89
23	Packing, rubber, and hose.	5,130.07		55.68	9.00		5,194.75
24	Paints, oils, chemicals, drugs, etc.	4,563.07	238.81				4,801.88
25	Pipe, fittings, plumbers' and gas-fitters' supplies.	29,839.32	41.96		46.00		29,927.28
26	Provender.						
27	Provisions.	1.57					1.57
28	Ship and boat equipment.	19,206.75	23,433.17	143.31	114.07	36.09	42,933.39
29	Stationery, books, and blanks.	79.53			.30		79.83
30	Stoves, galleys, and fixtures.	1,470.41			2.25		1,472.66
31	Tools.	18,553.41	40.59	9.60	2.60	1.50	18,607.70
32	Miscellaneous stores.	873.03	.88				873.91
	Total.	926,216.74	37,205.50	2,712.59	5,194.13	3,112.65	974,441.61

*Classified abstract of balance sheets of property returns, naval establishment, at navy-yard, Boston, Mass., for year ending June 30, 1892.*

ON HAND JUNE 30, 1892.

Class.	Articles.	Account A, general stock.	Account B, increase of the Navy.	Account C, reserved stores.	Account D, con- demned stores.	Account E, ex- empted stores.	Total.
1	Anchors, anchor gear, and chains.....	\$29,851.62	\$59,373.24	.....	.....	.....	\$89,224.86
2	Apparatus and materials, electric.....	4.00	.....	.....	.....	.....	4.00
3	Bags, boxes, and chests.....	3,614.57	.....	.....	\$6.20	.....	3,620.77
4	Blocks, etc.....	3,879.76	.....	.....	25.00	.....	3,904.76
5	Bolts, rivets, nuts, lag-screws, and washers.....	8,203.64	.....	.....	.....	.....	8,203.64
6	Brushes and brooms.....	145.99	.....	.....	.50	.....	146.49
7	Building materials.....	3,182.53	139.25	.....	150.00	.....	3,471.78
8	Canvas, cordage, and rigging.....	52,104.08	20,622.76	\$32.35	2,773.75	.....	75,532.94
9	Clothing.....	6.00	.....	.....	.....	.....	6.00
10	Dry goods.....	1,626.41	107.87	.....	13.86	.....	1,748.14
11	Fuel.....	5,690.40	321.35	.....	.....	.....	5,981.75
12	Furniture and fittings, galley, kitchen, house, and table.....	1,924.63	.....	.....	15.30	.....	1,939.98
13	Glass.....	219.05	.....	.....	.....	.....	219.05
14	Hardware.....	42,343.56	.....	.....	2,984.41	.....	45,327.97
15	Harness and horse furnishings.....	18.30	.....	.....	1.00	.....	19.30
16	Instruments and apparatus, miscellaneous.....	3,408.98	.....	.....	7.60	\$14,720.49	18,137.07
17	Lamps and lamp fixtures.....	742.22	.....	.....	15.15	191.60	948.97
18	Leather and belting.....	908.87	.....	.....	226.00	.....	1,134.87
19	Lumber and timber.....	118,696.86	.....	.....	6.50	.....	118,703.36
20	Machinery and machine tools.....	42,690.87	1,195.00	.....	264.68	.....	44,150.55
21	Metals.....	154,041.54	.....	.....	69.60	.....	154,111.14
22	Ordnance materials.....	1,316,911.82	18,665.51	509.00	1,148.55	.....	1,337,234.88
23	Packing, rubber, and hose.....	1,349.00	.....	30.15	117.35	.....	1,496.50
24	Paints, oils, chemicals, drugs, etc.....	19,552.84	149.37	.....	45.58	.....	19,747.79
25	Pipe, fittings, plumbers' and gas-fitters' supplies.....	12,370.22	.....	.....	43.50	.....	12,413.72
26	Provender.....	63.08	.....	.....	.....	.....	63.08
27	Provisions.....	.....	.....	.....	.....	.....	.....
28	Ship and boat equipment.....	11,664.91	108.80	.....	384.92	161.91	12,320.54
29	Stationery, books, and blanks.....	697.07	.....	.....	33.22	58.65	788.94
30	Stoves, galleys, and fixtures.....	729.91	.....	.....	.90	.....	730.81
31	Tools.....	23,941.46	189.40	.....	125.00	.....	24,255.86
32	Miscellaneous stores.....	283.48	.....	.....	45.80	.....	329.28
	Total.....	1,860,837.72	100,872.55	571.50	8,594.37	15,132.65	1,985,918.79

*Classified abstract of balance sheets of property returns, naval establishment, at navy-yard, New York, N. Y., for year ending June 30, 1892.*

ON HAND JUNE 30, 1892.

Class.	Articles.	Account A. general stock.	Account B. increase of the Navy:	Account C, re- served stores.	Account D, con- demned stores.	Account E, ex- empted stores.	Total.
1	Anchors, anchor gear, and chains	\$116,469.38	\$3,606.45	\$3,937.50	\$7.20	.....	\$134,020.53
2	Apparatus and materials, electric	1,142.28	622.82	634.00	1.00	\$43,408.82	45,808.92
3	Bags, boxes, and chests	28,179.84	3,242.24	1,083.73	277.44	.....	33,783.25
4	Blocks etc.	3,857.30	1,663.58	605.92	.....	.....	6,126.80
5	Bolts, rivets, nuts, lag-screws, and washers	14,093.97	12,958.69	116.69	.17	.....	27,169.52
6	Brushes and brooms	864.73	355.47	307.44	.....	.....	1,527.64
7	Building materials	14,198.53	1,280.93	22.50	25.40	.....	15,527.36
8	Canvas, cordage, and rigging	53,166.90	3,230.68	4,674.29	5,512.44	.....	66,584.31
9	Clothing	41.07	.....	.24	2.25	.....	43.56
10	Dry goods	2,871.07	156.32	1,865.38	35.98	.....	4,928.75
11	Fuel	2,593.97	17,079.90	31.47	.....	.....	30,605.34
12	Furniture and fittings, galley, kitchen, house, and table	2,524.34	567.64	3,736.46	158.96	.....	6,987.40
13	Glass	353.09	116.29	.....	.....	.....	469.38
14	Hardware	49,221.85	0,100.23	4,025.62	115.58	.....	59,463.28
15	Harness and horse furnishings	118.69	.....	.....	15.53	.....	134.22
16	Instruments and apparatus, miscellaneous	1,974.08	224.42	316.48	3.06	54,153.27	56,671.20
17	Lamps and lamp fixtures	3,158.08	193.50	781.95	81.28	11,558.61	15,773.49
18	Leather and belting	2,650.35	675.36	47.35	7.38	.....	3,380.44
19	Lumber and timber	99,165.72	24,414.49	.....	30,030.00	.....	153,610.21
20	Machinery and machine tools	57,016.04	12,810.43	6,166.03	653.47	.....	76,645.97
21	Metals	105,690.43	89,407.20	279.95	1,682.91	.....	197,060.49
22	Ordnance materials	1,943,713.25	154,528.96	32,715.30	17,376.89	.....	2,148,534.40
23	Packing, rubber, and hose	9,841.69	1,828.60	2,514.61	625.66	.....	14,810.56
24	Paints, oils, chemicals, drugs, etc.	13,497.62	3,513.49	428.18	.....	7.00	17,446.29
25	Pipe, fittings, plumbers' and gas-fitters' supplies	40,649.30	7,009.88	1,328.22	230.98	.....	59,218.38
26	Proviand	21.43	.....	.....	.....	.....	21.43
27	Provisions	37.60	.....	12.60	.....	.....	50.20
28	Ship and boat equipment	43,744.22	2,055.26	12,950.22	216.68	3,584.07	62,550.45
29	Stationery, books, and blanks	2,070.44	1,208.41	78.93	10.48	.....	4,368.26
30	Stoves, galleys, and fixtures	5,177.83	1,646.00	1,644.59	19.25	.....	8,487.67
31	Tools	25,483.35	4,362.07	1,832.06	457.10	.....	31,934.58
32	Miscellaneous stores	5,230.79	469.36	315.19	54.38	.....	6,069.72
	Total	2,658,719.23	361,228.76	87,257.90	57,601.44	112,711.77	3,277,519.10

*Classified abstract of balance sheets of property returns, naval establishment at navy-yard, League Island, Pa., for year ending June 30, 1892.*

ON HAND JUNE 30, 1892.

Class.	Articles.	Account A, general stock.	Account B, increase of the Navy.	Account C, reserved stores.	Account D, con- demned stores.	Account E, ex- empted stores.	Total.
1	anchors, anchor gear, and chains.....	\$15,441.66	\$63.58				\$15,505.24
2	Apparatus and materials, electric.....	268.91					268.91
3	Bags, boxes, and chests.....	536.48	108.89		\$7.40		652.77
4	Blocks, etc.....	8,886.79					8,886.79
5	Bolts, rivets, nuts, lag-screws, and washers.....	5,307.17					5,307.17
6	Brushes and brooms.....	293.76					293.76
7	Building materials.....	1,536.97					1,536.97
8	Canvas, cordage, and rigging.....	193.07	51.89		45.00		289.96
9	Clothing.....						
10	Dry goods.....	429.90					429.90
11	Fuel.....	720.83					720.83
12	Furniture and fittings, galley, kitchen, house, and table.....	270.12					270.12
13	Glass.....	107.28					107.28
14	Hardware.....	20,277.13					20,277.13
15	Harness and horse furnishings.....	16.37					16.37
16	Instruments and apparatus, miscellaneous.....	1,476.36			\$127.60		1,603.96
17	Lamps and lamp fixtures.....	333.03			4.63		337.66
18	Leather and belting.....	292.08					292.08
19	Lumber and timber.....	10,308.08					10,308.08
20	Machinery and machine tools.....	10,772.00					10,772.00
21	Metals.....	51,529.70					51,529.70
22	Ordnance materials.....	595,110.37	123,160.32		16.96		718,287.85
23	Packing, rubber, and hose.....	1,488.40					1,488.40
24	Paints, oils, chemicals, drugs, etc.....	2,945.73					2,945.73
25	Pipe, fittings, plumbers' and gas-fitters' supplies.....	17,065.95					17,065.95
26	Provender.....	9.00					9.00
27	Provisions.....						
28	Ship and boat equipment.....	5,519.13	6.85		45.05		5,571.63
29	Stationery, books, and blankets.....	86.25					86.25
30	Stoves, galleys, and fixtures.....	218.42					218.42
31	Tools.....	18,444.01					18,444.01
32	Miscellaneous stores.....	1,112.66					1,112.66
	Total.....	770,997.51	123,391.53		69.36	177.88	894,636.58

*Classified abstract of balance sheets of property returns, naval establishment at navy-yard, Washington, D. C., for year ending June 30, 1892.*

ON HAND JUNE 30, 1892.

Class.	Articles.	Account A, general stock.	Account B, increase of the Navy.	Account C, reserved stores.	Account D, con- demned stores.	Account E, ex- empted stores.	Total.
1	Anchors, anchor gear, and chains.....	\$18,095.20	\$119.24				\$18,214.44
2	Apparatus and materials, electric.....	184.34	1,203.63				1,387.97
3	Bags, boxes, and chests.....	5,722.55	17,058.92	\$96.71			22,865.18
4	Blocks, etc.....		1,673.28				1,673.28
5	Bolts, rivets, nuts, lag screws, and washers.....	337.66	8,215.37				3,553.03
6	Brushes and brooms.....	205.39	2,955.87				3,161.26
7	Building materials.....	1,765.17	13,550.36				15,315.53
8	Canvas, cordage, and rigging.....	692.27	6,073.03	24.67			6,790.97
9	Clothing.....	37.77	128.79				166.56
10	Dry goods.....	14,699.75	8,582.63	12.00			18,294.38
11	Fuel.....	6,639.51	25,407.83				32,047.34
12	Furniture and fittings, galley, kitchen, house, and table.....	4,273.45	6,430.89	3.80	\$41.15		10,749.29
13	Glass.....	184.28	88.94				273.22
14	Hardware.....	823.82	8,924.05		37.50		9,785.37
15	Harness and horse furnishings.....	3.45					3.45
16	Instruments and apparatus, miscellaneous.....	231.05	15,838.69		1.92	\$78.88	16,150.54
17	Lamps and lamp fixtures.....	182.89	509.56	181.74		28.00	902.19
18	Leather and belting.....	170.70	7,110.36		4.50		7,285.56
19	Lumber and timber.....	88,716.29	41,514.12				130,230.41
20	Machinery and machine tools.....	4,228.10	114,879.09				119,107.19
21	Metals.....	115,080.14	194,901.80		610.00		310,591.94
22	Ordnance materials.....	334,053.60	582,861.24	13,024.52	9.98		929,949.34
23	Packing, rubber, and hose.....	1,292.46	2,334.79				3,627.25
24	Paints, oils, chemicals, drugs, etc.....	3,793.47	27,084.42				30,877.89
25	Pipe, fittings, plumbers' and gas-fitters' supplies.....	1,969.31	19,569.78				21,539.09
26	Provender.....	249.75	121.71				371.46
27	Provisions.....	57.43	106.58				164.01
28	Ship and boat equipment.....	4,352.84	6,151.23	11.29	5.00	604.40	11,124.76
29	Stationery, books, and blanks.....	665.35	3,090.50				3,754.85
30	Stoves, galleys, and fixtures.....	298.62	484.16				782.78
31	Tools.....	1,303.15	12,207.72				13,510.87
32	Miscellaneous stores.....	21,536.03	44,184.86		553.35	9.90	66,284.14
	Total.....	631,825.79	1,163,349.44	13,344.73	1,263.40	721.18	1,810,504.54

*Classified abstract of balance sheets of property returns, naval establishment at navy-yard, Norfolk, Va., for year ending June 30, 1892.*

ON HAND JUNE 30, 1892.

Class.	Articles.	Account A, general stock.	Account B, increase of the Navy.	Account C, reserved stores.	Account D, con- demned stores.	Account E, ex- empted stores.	Total.
1	Anchors, anchor gear, and chains.....	\$105,486.07	\$1,773.89	\$5,341.58	\$144.81	.....	\$112,746.35
2	Apparatus and materials, electric.....	937.35	.....	28.38	.....	\$5,455.71	6,421.44
3	Bags, boxes, and chests.....	16,090.21	22.18	394.55	79.19	.....	16,586.13
4	Blocks, etc.....	23,291.96	22.10	263.39	295.88	.....	23,873.33
5	Bolts, rivets, nuts, lag screws, and washers.....	9,632.46	8,264.57	27.43	.72	.....	17,925.18
6	Brushes and brooms.....	1,044.01	284.25	1.97	1.02	.....	1,331.25
7	Building materials.....	12,944.12	1,718.55	1.00	.....	.....	14,663.67
8	Canvas, cordage, and rigging.....	52,720.11	3,832.50	8,044.74	914.17	.....	65,511.52
9	Clothing.....	33.08	.....	9.00	.....	.....	42.08
10	Dry goods.....	1,688.07	368.69	356.90	48.24	.....	2,461.90
11	Fuel.....	11,890.67	2,668.10	.....	.....	.....	14,558.77
12	Furniture and fittings, galley, kitchen, house, and table.....	5,884.05	.....	735.24	67.06	.....	6,686.35
13	Glass.....	500.27	70.47	.....	.....	.....	570.74
14	Hardware.....	32,584.33	5,676.39	1,163.50	101.68	.....	39,525.90
15	Harness and horse furnishings.....	205.03	.....	.....	.....	.....	205.03
16	Instruments and apparatus, miscellaneous.....	7,692.11	.....	224.56	62.25	6,168.17	14,147.09
17	Lamps and lamp fixtures.....	3,851.61	54.28	151.42	54.47	2,584.14	6,695.92
18	Leather and belting.....	6,788.10	323.78	.....	.....	.....	7,111.88
19	Lumber and timber.....	99,425.32	31,054.54	.....	.10	.....	130,479.96
20	Machinery and machine tools.....	32,654.36	21,081.66	29.98	2,460.79	.....	56,226.79
21	Metals.....	64,579.59	85,300.32	.....	3,037.81	.....	152,937.72
22	Ordnance materials.....	517,884.86	736.48	16,901.15	487.15	.....	536,000.64
23	Packing, rubber, and hose.....	12,775.75	584.31	395.11	5.30	.....	13,760.47
24	Paints, oils, chemicals, drugs, etc.....	7,841.63	5,743.78	.....	1.55	.....	13,586.96
25	Pipe, fittings, plumbers' and gas-fitters' supplies.....	53,111.86	14,551.23	410.94	32.32	.....	68,106.35
26	Proviender.....	1,108.01	.....	.....	306.08	.....	1,414.09
27	Provisions.....	7.82	.....	.....	.....	.....	7.82
28	Ship and boat equipment.....	21,522.49	1,062.58	3,992.11	646.97	1,922.76	29,146.91
29	Stationery, books, and blanks.....	1,011.09	66.64	4.12	.45	.....	1,082.30
30	Stoves, galleys, and fixtures.....	5,534.87	.....	1,633.96	195.20	.....	7,364.03
31	Tools.....	27,202.36	504.79	406.44	268.38	.....	28,381.97
32	Miscellaneous stores.....	2,576.99	1,238.96	340.14	66.43	.....	4,222.52
	Total.....	1,140,500.61	187,005.04	40,837.61	9,298.02	16,130.78	1,393,792.06



*Classified abstract of balance sheets of property returns, naval establishment at navy-yard, Pensacola, Fla., for year ending June 30, 1892.*

ON HAND JUNE 30, 1892.

Class.	Articles.	Account A, general stock.	Account B, increase of the Navy.	Account C, reserved stores.	Account D, con- demned stores.	Account E, ex- empted stores.	Total.
1	Anchors, anchor gear, and chains.....	\$8,362.47					\$8,362.47
2	Apparatus and materials, electric.....	662.42					662.42
3	Bags, boxes, and chests.....	2,632.47					2,632.47
4	Blocks, etc.....	1,703.13					1,703.13
5	Bolts, rivets, nuts, lag-screws, and washers.....	5,631.17					5,631.17
6	Brushes and brooms.....	402.90					402.90
7	Building materials.....	55,608.20					55,608.20
8	Canvas, cordage, and rigging.....	1,638.28					1,638.28
9	Clothing.....						
10	Dry goods.....	492.41					492.41
11	Fuel.....	7,013.03					7,013.03
12	Furniture and fittings, galley, kitchen, house, and table.....	98.40					98.40
13	Glass.....	259.80					259.80
14	Hardware.....	16,038.92					16,038.92
15	Harness and horse furnishings.....	14.01					14.01
16	Instruments and apparatus, miscellaneous.....	1,190.96					1,190.96
17	Lamps and lamp fixtures.....	327.27					327.27
18	Leather and belting.....	1,949.10					1,949.10
19	Lumber and timber.....	226,173.59					226,173.59
20	Machinery and machine tools.....	2,752.06					2,752.06
21	Metals.....	51,343.35					51,343.35
22	Ordnance materials.....	209,989.67					209,989.67
23	Packing, rubber, and hose.....	4,019.95					4,019.95
24	Paints, oils, chemicals, and drugs.....	2,208.13					2,208.13
25	Pipe, fittings, plumbers' and gasfitters' supplies.....	5,440.37					5,440.37
26	Provender.....	170.96					170.96
27	Provisions.....						
28	Ship and boat equipment.....	2,748.58					2,748.58
29	Stationery, books, and blanks.....	68.09					68.09
30	Stoves, galleys, and fixtures.....	43.01					43.01
31	Tools.....	6,110.19					6,110.19
32	Miscellaneous stores.....	3,732.74					3,732.74
	Total.....	\$18,825.63					\$18,825.63

*Classified abstract of balance sheets of property returns, naval establishment at navy-yard, Mare Island, Cal., for year ending June 30, 1892.*

ON HAND JUNE 30, 1892.

Class.	Articles.	Account A, general stock.	Account B, increase of the Navy.	Account C, reserved stores.	Account D, con- demned stores.	Account E, emptied stores.	Total.
1	Anchors, anchor gear, and chains .....	\$271,382.05	\$12,521.11	\$25,205.31	\$10.10	.....	\$309,118.57
2	Apparatus and materials, electric .....	2,578.79	.....	857.06	1.00	\$4,534.43	7,991.28
3	Bags, boxes, and chests ..	32,621.90	4,899.60	4,929.00	34	.....	42,450.84
4	Blocks, etc .....	612.70	.....	557.35	.....	.....	1,170.05
5	Bolts, rivets, nuts, lag-screws, and washers .....	11,211.17	3,072.87	528.15	.....	.....	14,812.19
6	Brushes and brooms .....	2,524.95	20.50	200.93	.....	.....	2,746.38
7	Building materials .....	876.27	2.00	18.91	.....	.....	897.18
8	Canvas, cordage, and rigging .....	89,140.36	1,509.50	57,982.42	2.00	.....	148,634.28
9	Clothing .....	27.00	.....	73.81	.....	.....	100.81
10	Dry goods .....	3,538.27	211.39	3,656.58	40.99	.....	7,447.23
11	Fuel .....	65,554.80	254.54	195.72	.....	.....	66,005.06
12	Furniture and fittings, galley, kitchen, house, and table .....	6,820.77	166.68	6,957.36	21.65	.....	13,966.46
13	Glass .....	164.18	36.00	2.49	.....	.....	202.67
14	Hardware .....	30,593.81	1,416.16	6,262.69	5.05	2.18	38,279.89
15	Harness and horse furnishings .....	112.55	.....	.....	.....	.....	112.55
16	Instruments and apparatus, miscellaneous .....	3,783.59	.....	393.95	34.35	39,692.52	43,904.41
17	Lamps and lamp fixtures ..	4,379.48	121.50	1,738.39	47.35	2,150.60	8,437.32
18	Leather and belting .....	4,552.59	.....	59.88	.....	.....	4,612.47
19	Lumber and timber .....	57,710.29	8,815.00	53.68	.....	.....	66,578.97
20	Machinery and machine tools .....	115,191.96	6,122.04	3,772.97	54.50	.....	125,141.47
21	Metals .....	137,151.37	43,736.86	440.34	.....	.....	181,328.57
22	Ordnance materials .....	1,194,709.22	124,527.86	107,590.88	35.56	.....	1,426,863.52
23	Packing, rubber, and hose ..	5,028.71	.....	3,016.06	21.21	.....	8,065.98
24	Paints, oils, chemicals, drugs, etc .....	11,113.67	2,606.36	980.02	.....	50	14,700.55
25	Pipe, fittings, plumbers' and gasfitters, supplies ..	55,378.23	1,217.51	1,872.31	40.00	.....	58,508.05
26	Providence .....	1,377.10	.....	.....	.....	.....	1,377.10
27	Provisions .....	53.76	.....	3.88	.....	.....	57.64
28	Ship and boat equipment ..	54,844.79	110.74	25,092.63	736.55	1,108.54	81,943.25
29	Stationery, books, and blanks .....	2,787.13	58.77	548.16	14.70	.....	3,408.76
30	Stores, galleys, and fixtures .....	4,051.08	1,923.60	1,747.42	59.50	.....	7,781.60
31	Tool .....	15,442.00	17.35	3,160.54	16.34	.....	18,636.23
32	Miscellaneous stores .....	2,787.02	48.23	303.51	10.00	.....	3,148.76
	Total .....	2,188,101.56	213,416.17	258,202.40	1,171.19	47,508.77	2,708,400.09

*Classified abstract of balance sheets of property returns, naval establishment at Naval Academy, Annapolis, Md., for year ending June 30, 1892.*

ON HAND JUNE 30, 1892.

Class.	Articles.	Account A, general stock.	Account B, increase of the Navy.	Account C, reserved stores.	Account D, con- demned stores.	Account E, ex- empted stores.	Total.
1	1 Anchors, anchor gear and chains.....	\$535.45	.....	\$8,820.21	.....	.....	\$9,355.66
2	2 Apparatus and materials, electric.....	462.33	.....	73.84	.....	.....	536.17
3	3 Bags, boxes and chests.....	4,707.80	\$754.18	1,351.35	.....	.....	6,815.33
4	4 Blocks, etc.....	160.35	.....	222.11	.....	.....	382.46
5	5 Bolts, rivets, nuts, lag-screws, and washers.....	166.67	.....	210.97	.....	.....	377.64
6	6 Brushes and brooms.....	471.96	.....	82.82	.....	.....	554.78
7	7 Building materials.....	18.65	.....	12.09	.....	.....	30.74
8	8 Canvas, cordage, and rigging.....	1,074.08	36.68	18,066.19	.....	.....	19,176.95
9	9 Clothing.....	.....	.....	.....	.....	.....	.....
10	10 Dry goods.....	210.75	.....	1,360.13	.....	.....	1,570.88
11	11 Fuel.....	16.73	.....	.....	.....	.....	16.73
12	12 Furniture and fittings, galley, kitchen, house, and table.....	113.47	.....	2,798.95	\$2.25	.....	2,914.67
13	13 Glass.....	257.33	.....	.50	.....	.....	257.83
14	14 Hardware.....	4,998.96	.....	8,112.84	.....	.....	8,111.80
15	15 Harness and horse furnishings.....	46.75	.....	.....	.....	.....	46.75
16	16 Instruments and apparatus, miscellaneous.....	139.33	.....	186.01	.....	.....	325.34
17	17 Lamps and lamp fixtures.....	243.67	.....	744.90	.....	.....	988.57
18	18 Leather and belting.....	47.43	.....	1.20	.....	.....	48.63
19	19 Lumber and timber.....	.....	.....	49.40	.....	.....	49.40
20	20 Machinery and machine tools.....	57.15	.....	2,723.63	.....	.....	2,780.78
21	21 Metals.....	775.12	.....	176.08	.....	.....	951.20
22	22 Ordnance materials.....	106,238.67	40,130.71	20,122.77	.....	.....	166,492.15
23	23 Packing, rubber, and hose.....	340.30	.....	1,182.12	.....	.....	1,522.42
24	24 Paints, oils, chemicals, drugs, etc.....	903.55	.....	398.95	.....	.....	1,302.50
25	25 Pipe, fittings, plumbers and gas-fitter's supplies.....	2,543.81	.....	664.56	.....	.....	3,208.37
26	26 Provender.....	.....	.....	.....	.....	.....	.....
27	27 Provisions.....	.....	.....	6.50	.....	.....	6.50
28	28 Ship and boat equipment.....	1,213.06	.....	44,012.32	.....	.....	45,225.38
29	29 Stationery, books, and blanks.....	24.15	.....	177.73	.....	.....	201.88
30	30 Stoves, galleys, and fixtures.....	281.54	.....	771.34	.....	.....	1,052.88
31	31 Tools.....	828.90	.....	899.22	.....	.....	1,728.12
32	32 Miscellaneous stores.....	9,135.60	.....	96.83	.....	.....	9,232.43
	Total.....	136,016.56	40,921.57	108,327.56	2.25	.....	285,267.94

*Classified abstract of balance sheets of property returns, naval establishment at Ordnance Proving Ground (Indian Head), Md., for year ending June 30, 1892.*

ON HAND JUNE 30, 1892.

Class.	Articles.	Account A, general stock.	Account B, increase of the Navy.	Account C, reserved stores.	Account D, con- demned stores.	Account E, ex- empted stores.	Total.
1	Anchors, anchor gear, and chains	71.14	57.82				\$128.96
2	Apparatus and materials, electric	519.34					519.34
3	Bags, boxes, and chests	579.31	96.86				676.17
4	Blocks, etc.	5.40	102.25				107.65
5	Bolts, rivets, nuts, lag-screws, and washers	37.24					37.24
6	Brushes and brooms	63.47					63.47
7	Building materials	110.74	84.00				194.74
8	Canvas, cordage, and rigging	160.43	73.00				233.43
9	Clothing						
10	Dry goods	813.33					813.33
11	Fuel	11.65	62.25				73.90
12	Furniture and fittings, galley, kitchen, house and table	938.72					938.72
13	Glass	16.11					16.11
14	Hardware	1,254.82					1,254.82
15	Harness and horse furnishings	85.65					85.65
16	Instruments and apparatus, miscellaneous	2,087.58	35.60				2,123.18
17	Lamps and lamp fixtures	112.62					112.62
18	Leather and belting	22.96					22.96
19	Lumber and timber	17.14					17.14
20	Machinery and machine tools	593.65					593.65
21	Metals	268.50	26.78				295.28
22	Ordnance materials	23,333.00	8,219.75				31,552.75
23	Packing, rubber, and hose	175.64	6.66				182.30
24	Paints, oils, chemicals, drugs, etc.	369.47	10.82				380.29
25	Pipe, fittings, plumbers and gas-fitters' supplies	202.78	160.09				362.87
26	Provender	114.25					114.25
27	Provisions	.75					.75
28	Ship and boat equipment	107.13					107.13
29	Stationery, books, and blanks	105.87					105.87
30	Stoves, galleys, and fixtures	253.55					253.55
31	Tools	2,134.16	1,242.39				3,376.55
32	Miscellaneous stores	464.56					464.56
	Total	35,030.96	10,178.27				45,209.23

*Classified abstract of balance sheets of property returns, naval establishment at naval station, Key West, Fla., for year ending June 30, 1892.*

ON HAND JUNE 30, 1892.

Class.	Articles.	Account A, general stock.	Account B, increase of the Navy.	Account C, reserved stores.	Account D, con- demned stores.	Account E, ex- empted stores.	Total.
1	Anchors, anchor gear, and chains.....	\$225.70					\$225.70
2	Apparatus and materials, electric.....	45.00					45.00
3	Bags, boxes, and chests.....	102.69					102.69
4	Blocks, etc.....	98.80					98.80
5	Bolts, rivets, nuts, lag-screws, and washers.....	1,915.96					1,915.96
6	Brushes and brooms.....	139.50					139.50
7	Building materials.....	75.87					75.87
8	Canvas, cordage, and rigging.....	1,356.57					1,356.57
9	Clothing.....						
10	Dry goods.....	32.40					32.40
11	Fuel.....	1,262.99					1,262.99
12	Furniture and fittings, galley, kitchen, house, and table.....	48.47					48.47
13	Glass.....						
14	Hardware.....	1,072.19					1,072.19
15	Harness and horse furnishings.....						
16	Instruments and apparatus, miscellaneous.....	21.60				\$244.65	266.25
17	Lamps and lamp fixtures.....	6.72					6.72
18	Leather and belting.....	241.17					241.17
19	Lumber and timber.....	160.81					160.81
20	Machinery and machine tools.....						
21	Metals.....	6,714.76					6,714.76
22	Ordnance materials.....	2,421.62					2,421.62
23	Packing, rubber, and hose.....	5,980.22					5,980.22
24	Paints, oils, chemicals, drugs, etc.....	1,227.32					1,227.32
25	Pipe, fittings, plumbers' and gas-fitters' supplies.....	415.56					415.56
26	Provender.....						
27	Provisions.....						
28	Ship and boat equipment.....	463.87					463.87
29	Stationery, books, and blanks.....	7.79					7.79
30	Stoves, galleys, and fixtures.....	34.20					34.20
31	Tools.....	721.03					721.03
32	Miscellaneous stores.....	356.99					356.99
	Total.....	25,149.80				244.65	25,394.45

*Classified abstract of balance sheets of property returns, naval establishment, at the Naval Observatory, Washington, D. C., for year ending June 30, 1892.*

ON HAND JUNE 30, 1892.

Class.	Articles.	Account A, general stock.	Account B, increase of the Navy.	Account C, reserved stores.	Account D, con- demned stores.	Account E, ex- empted stores.	Total.
1	Anchors, anchor gear, and chains.....						
2	Apparatus and materials, electric.....						
3	Bags, boxes, and chests.....						
4	Blocks, etc.....						
5	Bolts, rivets, nuts, lag-screws, and washers.....						
6	Brushes and brooms.....						
7	Building materials.....						
8	Canvas, cordage, and rigging.....						
9	Clothing.....						
10	Dry goods.....						
11	Fuel.....						
12	Furniture and fittings, galley, kitchen, house, and table.....						
13	Glass.....						
14	Hardware.....						
15	Harness and horse furnishings.....						
16	Instruments and apparatus, miscellaneous.....					\$40,622.36	\$40,622.36
17	Lamps and lamp fixtures.....						
18	Leather and belting.....						
19	Lumber and timber.....						
20	Machinery and machine tools.....						
21	Metals.....						
22	Ordnance materials.....					100.00	100.00
23	Packing, rubber, and hose.....						
24	Paints, oils, chemicals, drugs, etc.....						
25	Pipe, fittings, plumbers' and gas-fitters' supplies.....						
26	Proveuder.....						
27	Provisions.....						
28	Ship and boat equipment.....					27.40	27.40
29	Stationery, books, and blanks.....						
30	Stoves, galleys, and fixtures.....						
31	Tools.....						
32	Miscellaneous stores.....						
	Total.....					40,749.76	40,749.76

*Classified abstract of balance sheets of property returns, naval establishment at naval station, Puget Sound, Washington, for year ending June 30, 1892.*

ON HAND JUNE 30, 1892.

Class.	Articles.	Account A, general stock.	Account B, increase of the Navy.	Account C, reserved stores.	Account D, con- demned stores.	Account E, ex- empted stores.	Total.
1	Anchors, anchor gear and chains						
2	Apparatus and materials, electric	\$9,807.61					\$9,807.61
3	Bags, boxes, and chests	93.74					93.74
4	Blocks, etc						
5	Bolts, rivets, nuts, lag-screws, and washers	10.15					10.15
6	Brushes and brooms	12.92					12.92
7	Building materials						
8	Canvas, cordage, and rigging	2,869.64					2,869.64
9	Clothing	12.00					12.00
10	Dry goods	477.36					477.36
11	Fuel	376.64					376.64
12	Furniture and fittings, galley, kitchen, house and table	1,320.99					1,320.99
13	Glass						
14	Hardware	173.29					173.29
15	Harness and horse furnishings						
16	Instruments and apparatus, miscellaneous	8.08					8.08
17	Lamps and lamp fixtures	177.77					177.77
18	Leather and belting						
19	Lumber and timber						
20	Machinery and machine tools	225.93					225.93
21	Metals	.78					.78
22	Ordnance materials	6,864.78					6,864.78
23	Packing, rubber, and hose	125.64					125.64
24	Paints, oils, chemicals, drugs, etc	57.00					57.00
25	Pipes, fittings, plumbers' and gas-fitters' supplies	77.62					77.62
26	Proviender						
27	Provisions						
28	Ships and boat equipment	3,332.99					3,332.99
29	Stationery, books, and blanks	12.95					12.95
30	Stores, galleys, and fixtures	10.00					10.00
31	Tools	211.82					211.82
32	Miscellaneous stores	3.75					3.75
	Total	26,263.45					26,263.45

## APPENDIX G.

*Classified abstract of balance sheets of property returns, at all shore stations, for the year ending June 30, 1892.*

ON HAND JUNE 30, 1892.

Class.	Articles.	Account A. general stock.	Account B. increase of the Navy.	Account C. reserved stores.	Account D. condemned stores.	Account E. exempted stores.	Total.
1	Anchors, anchor gear, and chains.	\$642,731.85	\$92,515.33	\$53,512.78	\$164.08	.....	\$788,924.02
2	Apparatus and materials, electric.	14,135.65	1,826.45	1,563.23	2.62	.....	170,976.98
3	Bags, boxes, and chests.	102,356.86	26,419.93	7,632.14	400.32	.....	137,029.45
4	Blocks, etc.	43,169.57	3,461.21	1,756.77	323.08	.....	48,713.63
5	Bolt, rivets, nuts, lag screws, and washers.	65,610.82	27,541.77	883.24	13.76	.....	94,048.59
6	Brushes and brooms.	6,651.05	3,616.09	593.16	3.02	.....	10,863.32
7	Building materials.	97,152.59	16,775.09	54.50	175.40	.....	114,157.58
8	Canvas, cordage, and rigging.	289,940.05	41,617.69	94,054.48	10,625.38	.....	436,227.60
9	Clothing.	225.80	123.79	83.05	2.25	.....	439.89
10	Dry goods.	28,674.78	4,500.73	7,250.99	139.12	.....	40,566.62
11	Fuel.	114,277.56	46,663.97	227.19	359.52	.....	161,198.72
12	Furniture and fittings, galley, kitchen, house, and table.	26,337.74	7,165.21	14,301.31	.....	.....	48,168.78
13	Glasses.	2,507.52	311.70	2.99	.....	.....	2,822.21
14	Hardware.	247,680.46	25,598.00	14,589.35	3,292.76	2.18	291,132.84
15	Harness and horse furnishings.	631.37	.....	.....	16.53	.....	647.90
16	Instrumente and apparatus, miscellaneous.	26,334.56	16,098.71	1,124.22	111.17	.....	203,966.51
17	Lamps and lamp fixtures.	14,650.54	878.93	3,698.40	200.04	160,230.85	37,519.88
18	Leather and belting.	20,869.89	8,473.29	108.43	237.88	18,191.97	29,699.49
19	Lumber and timber.	810,717.33	108,632.38	109.08	30,036.60	.....	949,496.39
20	Machinery and machine tools.	310,878.50	156,082.22	13,128.99	3,761.94	.....	489,877.52
21	Metals.	885,031.42	413,041.96	896.37	6,243.93	.....	1,295,818.68
22	Ordnance materials.	6,646,991.33	1,052,830.83	199,256.95	21,778.52	100.00	7,930,643.64
23	Packing, rubber, and hose.	47,827.13	4,764.38	7,192.73	47.13	.....	60,593.85
24	Paints, oils, chemicals, drugs, etc.	69,684.53	39,347.05	1,877.15	362.80	7.50	110,993.86
25	Pipe, fittings, plumbers' and gas fitters' supplies.	228,978.81	43,560.45	4,642.94	.....	.....	276,490.00
26	Providence.	8,113.58	121.71	.....	306.08	.....	8,541.37
27	Provisions.	168.93	104.58	22.99	.....	.....	296.49
28	Ship and boat equipment.	109,985.10	23,928.63	86,238.13	3,134.19	7,516.05	200,762.09
29	Stationery, books, and blanks.	8,587.27	4,438.82	908.94	59.15	58.65	13,947.83
30	Scores, galleys, and fixtures.	18,168.44	4,033.76	8,272.63	277.10	.....	30,862.93
31	Tools.	140,815.73	18,594.51	6,107.99	996.43	1.50	166,526.51
32	Miscellaneous stores.	45,216.63	45,943.29	1,056.97	739.96	9.90	94,964.45
33	Total.	11,083,013.36	2,237,568.33	531,024.76	85,150.16	280,597.56	14,174,924.02
	Provision, clothing, small stores, and contingent as shown on Appendix.	.....	.....	.....	.....	.....	540,112.73
	General stores in transit to navy yards and stations.	.....	.....	.....	.....	.....	8,443.07
	Total.	.....	.....	.....	.....	.....	14,722,941.41



## APPENDIX H.

*Statement of the value of general stores received and expended on board ships in commission, for the year ended June 30, 1892.*

Bureaus.	Balance on hand July 1, 1891.	Receipts.	Total receipts.	Expended to use and condemned.	Transferred.	Total issues.	Balance on hand June 30, 1892.
Equipment.....	\$1,492,746.06	\$892,566.44	\$2,385,312.50	\$705,276.34	\$315,018.21	\$1,020,297.55	\$1,365,014.95
Ordnance.....	3,340,247.29	1,007,780.52	4,348,027.81	117,906.27	350,305.37	468,211.64	3,879,816.17
Construction.....	426,480.46	225,918.28	652,401.74	77,290.31	107,473.49	184,733.80	467,667.94
Steam Engineering.....	246,653.43	176,791.16	423,444.59	141,697.32	35,463.72	177,131.04	246,313.55
Equipment (exempt).....	223,436.41	97,947.49	320,783.90	11,087.91	62,618.57	73,706.48	247,077.42
Total.....	5,729,566.65	2,400,403.89	8,129,970.54	1,053,201.15	870,879.36	1,924,080.51	6,205,890.03

## SUMMARY.

Balance on hand July 1, 1891.....	\$5,729,566.65
Received during the year 1891-'92.....	2,400,403.89
Expended for use and condemned.....	1,053,201.15
Expended transferred.....	870,879.36
Balance on hand June 30, 1892.....	1,924,080.51
Value of general stores in transit from yards and stations to ships.....	6,205,890.03
Total value of general stores on board ships and in transit.....	39,738.35
	6,245,628.38

## APPENDIX I.

*Statement of public sales and report of deposits during the fiscal year 1892, on account of sales of Government property.*

Date of sale.	Place of sale.	By whom deposited.	Gross receipts.	Expenses of sales.	Net proceeds.	Credited to miscellaneous receipts.	Credited to appropriations.		
							Clothing and small stores.	Ordnance and ordnance material.	Small arms.
0 1891	New York	H. T. B. Harris.	\$3,202.62	\$10.20	\$3,183.42			\$3,183.42	
4 1891	Pennacola	H. T. Skelding.	5,633.07	350.05	5,273.42	\$3,952.62		2,320.80	
28 1891	Washington	A. W. Bacon.	5,993.60	43.98	9,040.62			1,949.05	
3 1891	Portsmouth.	J. Foster.	9,832.18	330.90	9,501.28	6,981.77	\$770.12	1,749.39	
15 1891	New York	H. T. B. Harris.	24,395.83	588.41	23,807.42	17,827.04	5,688.64	1,291.74	
25 1891	Norfolk	C. W. Slamm.	25.00		25.00	25.00			
Sept. 21, 1891	New York	H. T. B. Harris.	319.15	52.80	266.35				
Oct. 30, 1891	Mare Island	J. R. Stanton.	20,346.00	1,911.55	18,435.05	14,081.34	333.85	2,527.27	\$592.59
Dec. 15, 1891	Washington	A. W. Bacon.	9,439.90	60.45	9,579.45			9,579.45	
Jan. 30, 1892	Key West.	H. R. Smith.	309.50	6.00	303.50	303.50			
Mar. 19, 1892	Washington	A. W. Bacon.	136.05	136.05	16,900.25	66.42		16,842.83	
Apr. 30, 1892	New York	H. T. B. Harris.	17,045.30	18.00	62.50	62.50			
June 3, 1892	New London.	C. S. Williams.	254.06	25.00	229.06	167.73		62.33	
			92,068.21	3,551.99	88,516.22	43,624.17	6,792.61	87,504.85	592.59

*List of purchasers, with amount received from each.*

## Navy-yard, New York, Mar. 10, 1891:

Miller &amp; Brewer ..... \$3,202.62

## Navy-yard, Pensacola, Fla., May 4, 1891:

A. Adler ..... 36.68  
 E. Adler ..... 177.23  
 J. Barry ..... 235.60  
 J. Cosgrove ..... 283.85  
 A. G. Fell ..... 2.50  
 M. J. Faurie ..... .70  
 M. Gundersheimer ..... 1.05  
 J. Hallett ..... 120.45  
 W. Hutchinson ..... .50  
 J. Kanen ..... 440.55  
 L. Kaufman ..... 13.18  
 L. Levy ..... 22.80  
 A. Marx ..... 2,373.11  
 J. A. McDonald ..... 6.20  
 E. E. Saunders & Co. .... 23.85  
 L. Schwartz ..... 385.63  
 M. Schwartz ..... 1,489.46  
 M. White ..... 1.75  
 M. Zelricker ..... 16.38

5,633.07

## Navy-yard, Washington, D. C., May 28, 1891:

Jas. Rosenthal's Sons ..... 993.60

## Navy-yard, Portsmouth, N. H., June 3, 1891:

D. M. Anthony ..... 30.00  
 Thomas Butler & Co. .... 2,963.72  
 Downs & Co. .... 20.40  
 Levi F. S. Davis ..... 1,953.07  
 L. A. Comey ..... 209.04  
 Harry J. Freeman ..... 42.50  
 George B. French ..... 186.17  
 E. L. Fitzgerald ..... 407.52  
 C. J. Flynn ..... 353.00  
 Hallett & Son ..... 251.39  
 Frank L. Howe ..... 90.78  
 William Lynch ..... 161.34  
 F. A. Lunt ..... 17.69  
 B. F. Mugridge ..... 53.00  
 Nolan Bros. .... 635.83  
 A. Purvis & Son ..... 1,111.38  
 John Mullen ..... 665.10  
 Benjamin Russell ..... 16.50  
 James P. Saunders ..... 54.75  
 Rider & Cotton ..... 284.00  
 Sullivan & Reagan ..... 325.00

9,832.18

## Navy-yard, New York, June 15, 1891:

J. C. Abbey ..... 197.71  
 F. Bannerman ..... 213.44  
 Bossenius & Cunliffe ..... 195.55  
 Thos. Butler & Co. .... 2,773.76  
 David Boyce & Co. .... 97.44  
 Wm. Beardall ..... 18.28  
 John Comery ..... 139.88  
 L. A. Comey ..... 123.15  
 D. Donovan & Son ..... 656.25  
 John Dunn ..... 1,979.78  
 Chas. Dusenbury ..... 267.68  
 J. W. Ellsworth ..... 76.50  
 John Enderline ..... 30.00  
 S. C. Fralley ..... 108.44  
 Forsaith Machine Co. .... 1,082.50  
 Thos. A. Green ..... 319.25  
 A. H. Gibson ..... 5.00  
 M. H. Gregory ..... 2,075.00  
 J. H. Gregory ..... 61.50  
 John Gans ..... 39.50  
 Dennis Hayes ..... 7.00  
 R. Hetherston ..... 11.00  
 A. Hansen ..... 41.15  
 C. W. Harman ..... 61.00  
 Hallett & Son ..... 129.80  
 Nicholas Kane's Sons ..... 162.68

## Navy-yard, New York, June 15, 1891—Cont'd.

C. J. Lawless ..... \$120.59  
 A. McMahon ..... 1,459.61  
 F. Mulhauser & Co. .... 1,374.90  
 Garrett May ..... 121.00  
 Thos. R. Murphy ..... 15.00  
 J. J. Mahoney ..... 2,006.35  
 Nolan Bros. .... 255.00  
 A. Purvis & Son ..... 168.80  
 R. G. Packard ..... 160.00  
 D. W. Richards & Co. .... 2,392.15  
 James Robertson ..... 80.00  
 Seligman Bros. .... 1,270.87  
 F. N. Stow ..... 275.00  
 Solomon Bros. .... 24.40  
 H. Tomb ..... 30.00  
 R. Tobin & Son ..... 2,059.47  
 C. H. Townsend ..... 1,534.70  
 Walsh's Sons & Co. .... 190.65  
 J. P. Whittier ..... 60.00  
 Wm. H. Young ..... 15.00

24,395.83

## Navy-yard, Norfolk, Va., Aug. 25, 1891:

E. Bellows ..... 25.00

## Navy-yard, New York, Sept. 31, 1891:

J. C. Abbey ..... 319.15

## Navy-yard, Mare Island, Cal., Oct. 20, 1891:

Bacilio, Almarcia ..... 66.00  
 John R. Aden ..... 191.00  
 Francis Bannerman ..... 253.60  
 W. J. Bannerman ..... 15.00  
 Burnstine Bros. .... 2,177.29  
 F. C. Burgess ..... 25.00  
 W. C. Chapin ..... 169.50  
 John F. English ..... 170.00  
 S. Englander ..... 20.00  
 J. W. Ferris ..... 100.00  
 J. W. Frazier ..... 1,120.14  
 Lorents Foard ..... 1,207.48  
 Chas. Harley Co. .... 3,559.88  
 C. J. Hendry's Sons ..... 504.61  
 C. J. Jorgensen ..... 52.00  
 C. B. Johnson ..... 60.00  
 Paul Keyser ..... 104.00  
 A. Leitz ..... 15.00  
 R. Meyer ..... 10.00  
 John Molloy ..... 200.00  
 F. A. Oermats ..... 60.00  
 G. E. Raycheater ..... 773.34  
 H. J. Rogers & Co. .... 4,541.09  
 A. Rudgear ..... 28.00  
 M. Ragan ..... 73.50  
 Jacob Steffen ..... 20.00  
 J. W. Smith ..... 2,698.56  
 Thos. Smith ..... 45.00  
 Curtis Tobey ..... 884.37  
 L. Wenle ..... 265.00  
 Wright, Bowne & Co. .... 910.92  
 W. J. Wood ..... 26.50

20,346.60

## Navy-yard, Washington, D. C., Dec. 15, 1891:

Wm. Fisher ..... 3,050.00  
 J. B. Kendall ..... 1,917.65  
 M. Liabarger ..... 3,227.69  
 J. Rosenthal & Son ..... 51.25  
 E. H. Wilson & Co. .... 1,423.31

9,639.90

## Naval Station, Key West, Fla., Jan. 30, 1892:

Wm. Curry's Sons ..... 47.50  
 Williams & Johnson ..... 202.00

209.50

*List of purchasers, with amount received from each—Continued.*

Navy-yard, Washington, D. C., Mar. 19, 1892:		Naval Station, New London, Conn. June 3, 1892:	
J. Driefus & Co .....	\$50.00	Francis Bannerman .....	\$8.30
Lewis Hopfenmeier .....	70.50	R. H. Bailey .....	13.00
M. Lissberger .....	16,924.80	T. Butler & Co .....	27.00
		W. S. Chappell .....	22.00
	17,045.30	P. G. Gordon & Co .....	39.41
		John Mullen .....	133.25
		F. S. Peabody .....	6.00
		C. G. Williams .....	6.00
			254.96
Navy-yard, New York, Apr. 30, 1892:			
Jacob Fennel .....	35.50		
Wm. Herod .....	20.00		
Alex. Melville .....	15.00		
	70.50		

## RECAPITULATION.

New York .....	\$27,968.10
Penacola .....	5,633.07
Washington .....	27,678.80
Portsmouth .....	9,832.18
Norfolk .....	25.00
Mare Island .....	20,346.00
Key West .....	309.50
New London .....	254.96
Gross proceeds .....	92,068.21
Expenses of sales .....	3,561.99
Net proceeds .....	88,516.22
Deposited to credit:	
Miscellaneous receipts .....	43,624.17
Clothing and small-stores fund .....	6,792.61
Ordnance and ordnance material .....	37,506.85
Small arms .....	562.59
	\$88,516.22

## APPENDIX J.

*Proposals for fresh provisions and provender for the navy-yard, Portsmouth, N. H., under Bureau advertisement dated May 15, 1891; opened June 2, 1891.*

1,600 pounds fresh beef:		1,300 pounds fresh bread:	
Herman R. Paul .....	\$0.08 $\frac{8}{100}$	D. C. Norton & Co.* .....	\$0.05 $\frac{1}{2}$
Clarence M. Prince* .....	.08 $\frac{1}{2}$	James E. Chase .....	.07
1,600 pounds fresh vegetables:		Class D.—Provender:	
Herman R. Paul .....	.02 $\frac{2}{100}$	D. C. Norton & Co .....	1,809.14
Clarence M. Prince* .....	.02	Geo. A. Hammond* .....	1,802.40
		James E. Chase .....	1,885.20

*Proposals for fresh provisions and provender for the navy-yard, Boston, Mass., under Bureau advertisement dated May 15, 1891; opened June 2, 1891.*

45,000 pounds fresh beef:		15,000 pounds biscuit:	
M. J. Doran & Co .....	\$0.14	Austin & Graves } In bbls. ....	\$0.03 $\frac{3}{100}$
Chas. A. Simonds* .....	.12 $\frac{1}{2}$	} In tins. ....	.04 $\frac{4}{100}$
Balch & Mansfield .....	.13 $\frac{1}{2}$	Geo. C. Stickney .....	.04
45,000 pounds fresh vegetables:		30,240 pounds ice:	
M. J. Doran & Co .....	.04	Drivers' Union Ice Co.* & t. ....	.005
Chas. A. Simonds* .....	.03 $\frac{1}{2}$	Boston Ice Co.† .....	.005
Balch & Mansfield .....	.04 $\frac{1}{2}$	Class F.—Provender:	
30,000 pounds fresh bread:		John Mullett* .....	1,575.90
Geo. A. Sanderson .....	.05 $\frac{1}{2}$		
Austin & Graves* .....	.04 $\frac{4}{100}$		
Geo. C. Stickney .....	.05 $\frac{5}{100}$		

*Proposals for fresh provisions and provender for the naval station, New London, Conn. under Bureau advertisement dated May 15, 1891; opened June 2, 1891.*

4,024 pounds fresh beef:		3,447 pounds fresh bread ....	O. P.
Chas. H. Klinck* .....	\$0.12 $\frac{1}{2}$	9,000 pounds ice .....	O. P.
4,024 pounds fresh vegetables:		Provender .....	O. P.
Chas. H. Klinck* .....	.03		

\*Accepted.

†Decided by lot.

O. P.—Open purchase.

*Proposals for fresh provisions and provender for the New York navy-yard, under Bureau advertisement dated May 15, 1891; opened June 2, 1891.*

165,000 pounds fresh beef:		150,000 pounds fresh bread—	
W. H. Belford .....	\$0.07½	Continued.	
John Harrison* .....	.05½	James Lryfus .....	\$0.07½
James Dryfus .....	.08	John McNamara .....	.06½
Michael Clovnen .....	.05½	200,000 pounds biscuit:	
Plant Bros .....	.07	John Harrison* .....	.03½
John Hanley .....	.05½	Chas. F. Good- { In tins ..	.05½
Patrick Morrison .....	.09	win & Son. { In bb'ls ..	.0348
165,000 pounds fresh vegeta-		New York Bis- { In tins ..	.0539
bles:		cuit Co. { In bb'ls ..	.0349
W. H. Belford .....	.01½	Class E, ice:	
John Harrison* .....	.007	W. H. Belford .....	.0065
James Dryfus .....	.01½	John Harrison* .....	.00½
Michael Clovnen .....	.01½	James Dryfus .....	.007
Plant Bros .....	.01½	Knickerbocker Ice Co ...	.007
John Hanley .....	.00½	Class F:	
Patrick Morrison .....	.02	W. H. Belford .....	2,493.50
150,000 pounds fresh bread:		John Harrison .....	2,635.85
W. H. Belford .....	.06½	John Moonan* .....	2,459.00
John Harrison* .....	.02½	Chas. L. Richerson .....	2,753.40

*Proposals for fresh provisions and provender for the navy-yard, League Island, Pa., under Bureau advertisement dated May 15, 1891; opened June 2, 1891.*

10,000 pounds fresh beef:		Class C, ice:	
L. Shuster Boraef & Co.* ..	\$0.10	Knickerbocker Ice Co.* ..	.009
10,000 pounds fresh vegeta-		Class O, provender:	
bles:		Robert McKnight & Sons* 1,	139.00
L. Shuster Boraef* .....	.03½	Paul J. Field, jr .....	1,290.00
8,000 pounds fresh bread:			
John Levins* .....	.04		
L. Shuster Boraef & Co..	.04½		

*Proposals for fresh provisions and provender for the Naval Academy, under Bureau advertisement dated May 15, 1891; opened June 2, 1891.*

5,000 pounds fresh beef:		Class C, ice:	
Jackson Brewer .....	\$0.10½	Joseph S. M. Basil .....	\$0.004
John Kealy* .....	.08½	John B. Flood* .....	.00½
5,000 pounds fresh vegeta-		Class D, provender:	
bles:		Joseph S. M. Basil* .....	860.00
Jackson Brewer .....	.04	John B. Flood .....	896.00
John Kealy* .....	.03½	John Kealey .....	881.00
4,000 pounds fresh bread:			
Martin M. Smith* .....	.04		

*Proposals for fresh provisions and provender for the navy-yard, Washington, D. C., under Bureau advertisement dated May 15, 1891; opened June 2, 1891.*

4,000 pounds fresh bread:		Class D, 74,100 pounds ice:	
B. Charlton & Co .....	\$0.03½	Hygienic Ice Co.* .....	\$0.00½
F. W. Bergmann* .....	.03½	Independent Ice Co. ....	.00½
10,000 pounds biscuit:		Class E, provender:	
B. Charlton & { In tins ..	.06½	Danenhower & Co. ....	1,908.75
Co. { In bbls ..	.04½	R. G. Emshaw .....	1,912.00
Chas. I. Good- { In tins ..	.06½	Wm. Galt & Co* .....	1,830.00
win & Son. { In bbls ..	.04½		
James D. Mason & Co.,			
In bbls* .....	.03½		

\*Accepted.

*Proposals for fresh provisions and provender for the Norfolk navy-yard, under Bureau advertisement dated May 15, 1891; opened June 2, 1891.*

80,000 pounds fresh beef:		80,000 pounds fresh bread—	
Lewis Wasserman .....	\$0.06	Continued.	
E. L. Woodward .....	.06	C. T. Cable .....	\$0.03 $\frac{4}{10}$
Lewis Meyers .....	.06 $\frac{1}{10}$	F. Rieger * .....	.03 $\frac{3}{10}$
Dusch & Strosser .....	.06 $\frac{1}{2}$	60,000 pounds biscuit:	
Sam'l Westheimer .....	.05 $\frac{4}{10}$	James Reid & Co., bbls	
D. S. Baum * .....	.04 $\frac{1}{10}$	only .....	.04
80,000 pounds fresh vegeta-		Chas. T. Good- } In bbls .	.0371
bles:		& Son.* } In tins..	.0545
Lewis Wasserman .....	.01 $\frac{1}{10}$	James D. Mason & Co., in	
E. L. Woodward .....	.01 $\frac{1}{2}$	bbls .....	.0395
Lewis Myers .....	.01 $\frac{3}{10}$	Class E:	
Dusch & Stosser .....	.02 $\frac{1}{2}$	John K. Gann * .....	.007 $\frac{1}{10}$
Sam'l Westheimer .....	.03	James J. Linchan .....	.009 $\frac{1}{2}$
D. S. Baum * .....	.01 $\frac{1}{10}$	Class F, provender:	
80,000 pounds fresh bread:		O. L. Williams * .....	2024. 31
James Reid & Co .....	.03 $\frac{1}{2}$		

*Proposals for fresh provisions for the naval station, Key West, Fla., under Bureau advertisement dated May 15, 1891; opened June 2, 1891.*

10,000 pounds fresh beef:		8,000 pounds fresh bread:	
S. O. Johnson * .....	\$0.12	S. O. Johnson * .....	\$0.10
10,000 pounds fresh vegetables:		14,640 pounds ice:	
S. O. Johnson * .....	.06	S. O. Johnson * .....	.03

*Proposals for fresh provisions and provender for the navy-yard, Pensacola, Fla., under Bureau advertisement dated May 15, 1891; opened June 2, 1891.*

3,000 pounds fresh beef:		2,000 pounds fresh bread—	
William L. Hubbard .....	\$0.11 $\frac{1}{2}$	Continued.	
Fred. Bauer .....	.12	J. O. Neal .....	\$0.06
John S. Bell * .....	.10	Class C.—50,000 pounds ice:	
J. O. Neal .....	.13	E. E. Saunders .....	.01
3,000 pounds fresh vegetables:		Cary & Co.* .....	.00 $\frac{1}{2}$
William L. Hubbard .....	.01 $\frac{1}{2}$	J. O. Neal .....	.01
Fred. Bauer .....	.04	Class D.—Provender:	
John S. Bell * .....	.05	Fred. Bauer * .....	851. 38
J. O. Neal .....	.06	J. O. Neal .....	997. 45
2,000 pounds fresh bread:		Benjamin Dolphin .....	870. 55
Moses White .....	.06	B. A. Thilibert .....	931. 95
Fred Bauer * .....	.05 $\frac{1}{2}$		

*Proposals for annual supplies for the Naval Home, Philadelphia, Pa., under bureau advertisement dated May 7, 1891; opened June 2, 1891.*

Class A, brushes:		Class G, coal:	
J. Jacob Shannon & Co.* ..	\$155.08	Joseph W. Mathers * .....	\$3,504.00
Roller & Shoemaker .....	161.99	Bloomington Mining Co .	3,592.00
Class B, bricks, etc:		Dan'l L. Hutchinson, jr..	3,752.50
Paul J. Field, jr * .....	377.60	Thomas McConnell .....	3,922.50
Class C, halliards, etc.:		Geo. B. Newton & Co ....	3,885.00
Chas. J. Field * .....	29.89	Chas. P. Norton & Co....	3,762.50
J. B. Shannon Sons .....	29.98	Class H, firewood:	
Class D, clothing:		Joseph W. Mathers * ....	180.75
Wanamaker & Brown ...	6,958.75	Bloomington Mining Co .	212.50
(Allen H. Reed) Jacob		Thos. McConnell .....	325.00
Reeds Sons* .....	6,907.00	J. Jacob Shannon & Co..	192.50
Class E, shoes, etc.:		Class I, ware:	
Robbert Holland * .....	1,205.00	Chas. J. Field .....	541.96
Class F, Dry Goods:		Paul J. Field, jr. ....	785.90
Thomas G. Hood .....	1,247.34	J. Jacob Shannon & Co.*	488.78
Wm. F. Bernstein * .....	1,189.72		

\*Accepted.

*Proposals for annual supplies for the Naval Home, Philadelphia, Pa., etc.—Continued.***Class K, furniture:**

Chas. J. Field .....	\$420.00
Win. Hempton .....	490.50
Paul J. Field, jr .....	384.75
J. Jacob Shannon & Co.* .....	349.24

**Class L, glass:**

Chas. J. Field .....	40.99
Lewis U. Bean .....	52.82
J. Jacob Shannon & Co.* .....	31.87
Roller & Shoemaker ....	54.18

**Class M, hardware:**

Chas. J. Field * .....	214.22
Paul J. Field, jr .....	360.60
J. Jacob Shannon & Co..	272.43
J. B. Shannon & Sons....	315.76

**Class N, lumber:**

J. W. Gaskill & Sons .....	750.30
Chas. B. Maule * .....	636.10

**Class O, paints:**

Lewis U. Bean .....	521.85
J. Jacob Shannon & Co.* .....	423.54
Robt. J. Kelly .....	474.39
J. B. Shannon & Sons .....	561.14
Roller & Shoemaker .....	511.84

**Class P, provender:**

Paul J. Field, jr. * .....	366.40
Phila. Home-Made Bread Co .....	392.30

**Class Q, Provisions:**

Sam'l Sproul * .....	9,233.95
W. H. Belford .....	12,183.26
Robt. McKeown .....	9,718.85

**Class R, provisions:**

L. Shuster Boraef .....	\$11,474.00
Chas. Roesch & Sons .....	14,043.50
Wm. A. Detsch .....	12,634.00
Thomas Bradley .....	9,717.00
Dan'l Snyder & Sons * .....	9,712.00

**Class S, provisions:**

Geo. W. Wanklin * .....	2,290.00
Phila. Home-Made Bread Co .....	3,060.00
Robt. McKeown .....	2,305.00
John Levins .....	2,610.00

**Class T, stoves and fixtures:**

Chas. J. Field .....	165.35
J. Jacob Shannon & Co.* .....	154.39

**Class U, tools:**

Chas. J. Field * .....	30.34
J. Jacob Shannon & Co..	35.93
J. B. Shannon & Sons....	40.17

**Class V, ice:**

Chas. B. Rees Son & Co.* † .....	300.00
Knickerbocker Ice Co....	300.00

**Class W, soap, etc.:**

Sam'l Sproul .....	357.55
Robt. McKeown .....	355.69
Oliver Parker .....	358.81
Roller & Shoemaker ....	358.37

**Class X, harness:**

Paul J. Field, jr. * .....	96.00
J. Jacob Shannon & Co.* .....	26.92

*Proposals for fresh provisions and provender for the naval torpedo station under Bureau advertisement dated May 15, 1891; opened June 9, 1891.***40,000 pounds fresh beef:**

John T. Reagan .....	\$0.08½
Patrick Keefe* .....	.08
Thos. Gladding & Sons..	.12½

**40,000 pounds fresh vegetables:**

John T. Reagan .....	.02½
Patrick Keefe* .....	.02½
Thos. Gladding & Sons..	.03

**30,000 pounds fresh bread:**

Jeremiah J. Lynch* .....	\$0.03½
R. & W. Franklin .....	.05
Simeon Davis .....	.04½

**200,000 gallons water:**

Lawton Coggeshall* ....	.007
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*Proposals for fresh provisions and provender for the navy-yard, Mare Island, Cal., under advertisement dated May 15, 1891; opened June 9, 1891.***70,000 pounds fresh beef:**

Samuel Brown* † .....	\$0.07
J. H. McCudden .....	.07½
Jacob Steffan .....	.07½
Jacob Stutz .....	.07
Charles Ratto .....	.07½

**70,000 pounds fresh vegetables:**

Samuel Brown* † .....	.01½
J. H. McCudden .....	.01½
Jacob Steffan .....	.01½
Jacob Stutz .....	.01½
Charles Ratto .....	.01½

**70,000 pounds fresh bread:**

Joseph Boss .....	\$0.03½
Jacob Stutz .....	.05
Brown & Fleming* .....	.03½

**100,000 pounds biscuit:**

C. H. Bogart .....	.07
American Biscuit Co.* ..	.06½

**Class E:**

Henry Connely .....	.02½
Merchants' Refrigerating Co.* .....	.00½

**Class F:**

Louis E. Lake* .....	4,093.50
A. Powell .....	5,226.00

\* Accepted

† Decided by lot.

*Proposals for provisions, clothing, etc., for the New York navy yard under Bureau advertisement dated May 27, 1891—opened June 16, 1891.*

<b>5,000 pounds oatmeal:</b>		<b>73,000 pounds sugar:</b>	
Thomas W. Ormiston *	\$0.04 7 <sup>5</sup> / <sub>100</sub>	Thomas W. Ormiston	\$0.04 7 <sup>5</sup> / <sub>100</sub>
J. B. Morrell & Co	.05	Rowland A. Robbins	.04 1 <sup>0</sup> / <sub>100</sub>
Kemp, Day & Co	.05 1 <sup>0</sup> / <sub>100</sub>	Francis H. Leggett & Co.*	.04 1 <sup>0</sup> / <sub>100</sub>
Chas. E. Ahrens	.04 8 <sup>9</sup> / <sub>100</sub>	Thurber, Whyland & Co.	.04 1 <sup>0</sup> / <sub>100</sub>
<b>3,000 pounds hominy:</b>		Chas. E. Ahrens	.04 1 <sup>0</sup> / <sub>100</sub>
Thomas W. Ormiston *	.03 8 <sup>3</sup> / <sub>100</sub>	<b>10,000 pounds pickles:</b>	
Kemp, Day & Co	.04 1 <sup>0</sup> / <sub>100</sub>	F. Foehrenbach*	.07 1 <sup>0</sup> / <sub>100</sub>
Chas. E. Ahrens	.03 8 <sup>3</sup> / <sub>100</sub>	Kemp, Day & Co	.06 1 <sup>0</sup> / <sub>100</sub>
<b>31,850 pounds wheat flour:</b>		<b>1,700 gallons sirup:</b>	
Chas. T. Goodwin & Son.	.02 5 <sup>6</sup> / <sub>100</sub>	Thomas W. Ormiston*	.26 1 <sup>0</sup> / <sub>100</sub>
Thomas W. Ormiston	.02 5 <sup>6</sup> / <sub>100</sub>	Gustave H. Jahn	.32
J. B. Morrell & Co.	.02 1 <sup>0</sup> / <sub>100</sub>	Francis H. Leggett & Co	.35
Francis H. Leggett & Co.	.02 5 <sup>6</sup> / <sub>100</sub>	Chas. E. Ahrens	.32
Rowland & Co.*	.02 5 <sup>6</sup> / <sub>100</sub>	<b>1,400 gallons vinegar:</b>	
Chas. E. Ahrens	.02 5 <sup>6</sup> / <sub>100</sub>	F. Foehrenbach*	.13
<b>110,000 pounds salt pork:</b>		Chas. E. Ahrens	.15 1 <sup>0</sup> / <sub>100</sub>
Francis H. Leggett & Co	{ .06 1 <sup>0</sup> / <sub>100</sub>	<b>41,000 pounds tinned vegetables:</b>	
Chas. F. Matilage *	{ .07 1 <sup>0</sup> / <sub>100</sub>	Thomas W. Ormiston	.07
	{ .06 7 <sup>5</sup> / <sub>100</sub>	Francis H. Leggett & Co.*	.05 2 <sup>0</sup> / <sub>100</sub>
	{ .07 1 <sup>0</sup> / <sub>100</sub>	Kemp, Day & Co	.07 1 <sup>0</sup> / <sub>100</sub>
<b>12,000 pounds rice:</b>		Chas. E. Ahrens	.07 1 <sup>0</sup> / <sub>100</sub>
Thomas W. Ormiston	.06 1 <sup>0</sup> / <sub>100</sub>	<b>2,000 whisp brooms:</b>	
Gustave A. Jahn *	.06	Joseph Wechsler	.15 2 <sup>0</sup> / <sub>100</sub>
Francis H. Leggett & Co.	.06 6 <sup>0</sup> / <sub>100</sub>	J. B. Monell & Co.	.17
Chas. E. Ahrens	.06 6 <sup>0</sup> / <sub>100</sub>	Rowland A. Robbins	.16 1 <sup>0</sup> / <sub>100</sub>
<b>2,400 pounds raisins:</b>		Tissot & Schultz*	.14 1 <sup>0</sup> / <sub>100</sub>
Thomas W. Ormiston	.07 2 <sup>0</sup> / <sub>100</sub>	<b>2,500 spools black linen thread:</b>	
Francis H. Leggett & Co.	.07 2 <sup>0</sup> / <sub>100</sub>	Joseph Wechsler	.06
Kemp, Day & Co.*	.06 1 <sup>0</sup> / <sub>100</sub>	Tissot & Schultz*	.05 1 <sup>0</sup> / <sub>100</sub>
Chas. E. Ahrens	.07 1 <sup>0</sup> / <sub>100</sub>	Hans Hemkin	.06
<b>17,000 pounds roast beef:</b>		<b>2,500 spools spool cotton:</b>	
Francis H. Leggett & Co.	.07 7 <sup>5</sup> / <sub>100</sub>	Joseph Wechsler*	.03 1 <sup>0</sup> / <sub>100</sub>
Henry M. Anthony	.07 1 <sup>0</sup> / <sub>100</sub>	Tissot & Schultz	.03 1 <sup>0</sup> / <sub>100</sub>
Chas. F. Matilage *	.06 3 <sup>0</sup> / <sub>100</sub>	Hans Hemkin	.06
Kemp, Day & Co.	.11 1 <sup>0</sup> / <sub>100</sub>	<b>5,000 dozen rubber buttons, small:</b>	
<b>17,000 pounds tinned mutton:</b>		Joseph Wechsler	.03 1 <sup>0</sup> / <sub>100</sub>
Francis H. Leggett & Co*	.10 7 <sup>5</sup> / <sub>100</sub>	Tissot & Schultz*	.03 1 <sup>0</sup> / <sub>100</sub>
Kemp, Day & Co.	.12 1 <sup>0</sup> / <sub>100</sub>	Hans Hemkin	.43 1 <sup>0</sup> / <sub>100</sub>
<b>27,000 pounds tinned corned beef:</b>		<b>4,000 boxes blacking:</b>	
Francis H. Liggett & Co.	.09 5 <sup>6</sup> / <sub>100</sub>	J. B. Morrell & Co.	.03 1 <sup>0</sup> / <sub>100</sub>
Henry M. Anthony	.08 5 <sup>6</sup> / <sub>100</sub>	Roland A. Robbins *	.03
Chas. F. Matilage *	.07 1 <sup>0</sup> / <sub>100</sub>	Chas. E. Ahrens	.03 1 <sup>0</sup> / <sub>100</sub>
Kemp, Day & Co.	.11 1 <sup>0</sup> / <sub>100</sub>	<b>10,000 yards duck (unbleached):</b>	
<b>6,000 pounds brawn:</b>		Joseph Wechsler	.09 1 <sup>0</sup> / <sub>100</sub>
Francis H. Leggett & Co	.11 3 <sup>0</sup> / <sub>100</sub>	J. B. Monell & Co	.09 1 <sup>0</sup> / <sub>100</sub>
Chas. F. Matilage *	.10 4 <sup>0</sup> / <sub>100</sub>	Rowland A. Robbins	.09 1 <sup>0</sup> / <sub>100</sub>
Kemp, Day & Co.	.11 1 <sup>0</sup> / <sub>100</sub>	Tissot & Schultz*	.09 1 <sup>0</sup> / <sub>100</sub>
<b>20,000 pounds ham:</b>		Jacob T. Van Wyck	.09 1 <sup>0</sup> / <sub>100</sub>
Francis H. Leggett & Co.*	.13 6 <sup>0</sup> / <sub>100</sub>	<b>5,000 yards bleached duck:</b>	
Kemp, Day & Co.	.16	Joseph Wechsler	.13 1 <sup>0</sup> / <sub>100</sub>
<b>4,500 pounds bacon:</b>		J. B. Monell & Co	.12 1 <sup>0</sup> / <sub>100</sub>
Kemp, Day & Co.*	.09 1 <sup>0</sup> / <sub>100</sub>	Rowland A. Robbins	.14 1 <sup>0</sup> / <sub>100</sub>
<b>5,000 pounds sausage:</b>		Tissot & Schultz	.13 1 <sup>0</sup> / <sub>100</sub>
Francis H. Leggett & Co.*	.11 1 <sup>0</sup> / <sub>100</sub>	Jacob T. Van Wyck *	.10 1 <sup>0</sup> / <sub>100</sub>
Kemp, Day & Co.*	.11 1 <sup>0</sup> / <sub>100</sub>	<b>5,000 watch caps:</b>	
<b>4,000 pounds fish:</b>		Joseph Wechsler	.43
Kemp, Day & Co	.10 1 <sup>0</sup> / <sub>100</sub>	Rowland A. Robbins	.44 1 <sup>0</sup> / <sub>100</sub>
Chas. E. Ahrens*	.09 2 <sup>0</sup> / <sub>100</sub>	B. Y. Pippey & Co	.42 1 <sup>0</sup> / <sub>100</sub>
<b>1,000 pounds tea:</b>		Tissot & Schultz	.44 1 <sup>0</sup> / <sub>100</sub>
Thomas W. Ormiston *	.26 2 <sup>0</sup> / <sub>100</sub>	Samuel Baron*	.43 1 <sup>0</sup> / <sub>100</sub>
J. B. Monell & Co.	.32	Horstmann Bros.	.43 1 <sup>0</sup> / <sub>100</sub>
Francis H. Leggett & Co	.26 2 <sup>0</sup> / <sub>100</sub>		
Chas. E. Ahrens	.27 3 <sup>0</sup> / <sub>100</sub>		
Robt. G. Thomas	.28 1 <sup>0</sup> / <sub>100</sub>		

\* Accepted.



*Proposals for provisions, clothing, etc., for the New York navy yard—Continued.*

5,000 yards cloth (trousers):		2,500 yards overcoat cloth—	
B. Y. Pippey & Co.....	\$2.34	Continued.	
Wendell, Fay & Co.*.....	2.24 <sup>50</sup> / <sub>100</sub>	Wendell, Fay & Co.....	\$2.92 <sup>75</sup> / <sub>100</sub>
Sullivan, Vail & Co.....	2.25	Sullivan, Vail & Co.*.....	2.65 <sup>50</sup> / <sub>100</sub>
5,000 yards cap cloth:		5,000 pairs shoes:	
B. Z. Pippey & Co.....	1.94	Joseph Wechsler.....	1.64 $\frac{1}{2}$
Wendell, Fay & Co.....	1.87 <sup>50</sup> / <sub>100</sub>	Monroes, Packard & Lin-	
Sullivan, Vail & Co.*.....	1.87	scott.....	1.59 $\frac{1}{2}$
2,500 yards overcoat cloth:		Freeman Shoe Manufac-	
B. Y. Pippey & Co.....	2.98	turing Co.*.....	1.59

*Proposals for coal for the naval hospitals, etc., under Bureau advertisement dated May 22, 1891, opened June 30, 1891.*

Class A, naval hospital, Wi-		Class F—Continued.	
dow's Island, Me.:		Bloomington Mining Co.	\$55.00
David Duncan & Son*....	\$112.50	Thomas McConnell.....	57.50
Class B, naval hospital, Ports-		David S. Wells*.....	54.00
mouth, N. H.:		Class G, naval hospital, Wash-	
David Duncan & Son.....	1,227.60	ington, D. C.:	
Joseph F. Hett.....	1,502.60	Geo. L. Sheriff*.....	419.20
Samuel G. French*.....	1,196.80	Stephenson & Bro.....	432.00
James M. Salter.....	1,429.60	Class H, naval dispensary,	
Class C, naval hospital, Chel-		Washington, D. C.:	
sea, Mass.:		Geo. L. Sheriff*.....	45.52
C. A. Campbell*.....	1,787.10	Stephenson & Bro.....	48.00
David Duncan & Son.....	2,123.80	Class I, museum Hygiene,	
Bloomington Mining Co.	2,178.75	Washington, D. C.:	
Samuel G. French.....	1,975.80	Geo. L. Sheriff*.....	207.60
J. E. Lewis, & Co.....	1,855.00	Stephenson & Bro.....	216.00
Class D, naval hospital,		Class K, naval hospital, Nor-	
Brooklyn, N. Y.:		folk, Va.:	
David Duncan & Son.....	3,180.00	David Duncan & Son....	1,785.00
Bloomington Mining Co.	3,442.50	Nottingham & Wrenn....	1,698.75
Samuel G. French.....	3,030.00	Bloomington Mining Co.	1,708.75
Barber & Siegler.....	3,185.00	Geo. W. Taylor & Co....	1,852.50
David S. Wells.....	3,090.00	W. & J. Parker*.....	1,683.75
Class E, naval hospital, Phila-		Class L, naval dispensary,	
delphia, Pa.:		Norfolk, Va.:	
Joseph W. Mathers.....	1,548.20	Nottingham & Wrenn....	36.45
David Duncan & Son.....	1,516.25	W. & J. Parker*.....	31.50
Bloomington Mining Co.	1,484.30	Class M, naval hospital, Pen-	
Samuel G. French.....	1,548.20	sacola, Fla.:	
Chas. D. Norton & Co....	1,487.65	Cary & Co*.....	150.00
Frauk K. Ward.....	1,565.95	Class N, naval hospital, Mare	
Chas. S. Lowry*.....	1,462.60	Island, Cal.:	
Thomas McConnell.....	1,683.50	Husband & Brooks*.....	2,310.00
David S. Wells.....	1,636.55	David Duncan & Son....	4,875.00
Class F, naval dispensary,		A. F. Barnard.....	2,525.00
League Island, Pa.:		Henry Rosenfield.....	2,485.99
Joseph W. Mathers.....	60.00	John L. Howard { bid A.	2,460.00
David Duncan & Son....	57.50	{ bid B.	2,375.00

*Proposals for coal for the navy-yard, Portsmouth, N. H., under Bureau advertisement dated May 22, 1891, opened June 30, 1891.*

Class 1:		Class 3:	
David Duncan & Son... \$10,510.50		David Duncan & Son... \$2,120.00	
J. A. Walker..... 10,516.00		J. A. Walker..... 2,250.00	
Bloomington Mining Co. 10,383.75		Bloomington Mining Co*† 2,120.00	
Samuel G. French..... 10,074.00		Samuel G. French..... 2,120.00	
David S. Wells*..... 9,711.00		Class 4:	
Class 2:		Horace G. Whittier.....	195.50
David Duncan & Son... 76.68		William G. Brown*.....	191.25
J. A. Walker..... 67.20		George A. Hammond....	340.00
Samuel G. French..... 78.00		Samuel G. French.....	255.00

\*Accepted.

*Proposals for fuel for the navy-yard, Boston, Mass., under Bureau advertisement dated May 22, 1891, opened June 30, 1891.*

<b>Class 5:</b>		<b>Class 7—Continued.</b>	
David Duncan & Son....	\$1,494.00	Samuel G. French .....	\$1,235.00
C. A. Campbell* .....	1,260.00	David S. Wells* .....	1,152.50
J. Albert Walker & Co ..	1,416.00	<b>Class 8:</b>	
Edward B. Townsend....	1,584.00	David Duncan & Son....	45.00
Bloomington Mining Co ..	1,356.00	C. A. Campbell* .....	32.40
Samuel G. French .....	1,272.00	J. Albert Walker & Co ..	35.10
David S. Wells .....	1,323.00	Edward B. Townsend ...	34.50
<b>Class 6:</b>		Samuel G. French .....	42.00
David Duncan & Son ...	9,925.00	<b>Class 9:</b>	
M. L. Cobb .....	9,725.00	David Duncan & Son....	924.00
C. A. Campbell .....	10,050.00	M. L. Cobb .....	844.20
J. Albert Walker & Co ..	9,875.00	C. A. Campbell .....	844.20
Edward B. Townsend ...	9,825.00	J. Albert Walker & Co*..	835.80
Bloomington Mining Co ..	9,712.50	Edward B. Townsend ...	882.00
Curran & Burton* .....	9,675.00	Bloomington Mining Co ..	857.85
Samuel G. French .....	9,950.00	Samuel G. French .....	893.00
<b>Class 7:</b>		<b>Class 10:</b>	
David Duncan & Son....	1,292.50	Taylor P. Thompson* ...	36.00
C. A. Campbell .....	1,207.50	<b>Class 11:</b>	
J. Albert Walker & Co ..	1,245.00	C. A. Campbell* .....	176.00
Edward B. Townsend....	1,250.00	Taylor P. Thompson ....	186.00
Bloomington Mining Co ..	1,298.75		

*Proposals for fuel for the torpedo station, Newport, R. I., under Bureau advertisement dated May 22, 1891, opened June 30, 1891.*

<b>Class 12:</b>		<b>Class 13:</b>	
David Duncan & Son* ...	\$4,608.00	David Duncan & Son....	\$103.50
Bloomington Mining Co ..	4,786.40	Gardner B. Reynolds* ...	86.25
Gardner B. Reynolds ....	4,743.00	Samuel G. French .....	87.00
Samuel G. French .....	4,646.80		
David S. Wells .....	4,809.60		

*Proposals for fuel for the training station, Newport, R. I., under Bureau advertisement dated May 22, 1891, opened June 30, 1891.*

<b>Class 14:</b>		<b>Class 15—Continued.</b>	
David Duncan & Son....	\$1,080.00	Samuel G. French* .....	\$6,652.00
Bloomington Mining Co ..	1,005.25	David S. Wells .....	6,902.00
Gardner B. Reynolds ...	3,872.50	<b>Class 16:</b>	
Samuel G. French .....	3,959.00	Gardner B. Reynolds ....	45.00
David S. Wells .....	3,893.00	Samuel G. French* .....	43.50
<b>Class 15:</b>		<b>Class 17:</b>	
David Duncan & Son....	6,720.00	Gardner B. Reynolds* ...	3.60
Bloomington Mining Co ..	6,851.00	Samuel G. French .....	4.20
Gardner B. Reynolds ....	6,770.00		

*Proposals for fuel for the naval station, New London, Conn., under Bureau advertisement dated May 22, 1891, opened June 30, 1891.*

<b>Class 18:</b>		<b>Class 19—Continued.</b>	
David Duncan & Son....	\$480.00	Bloomington Mining Co* ..	\$583.50
Bloomington Mining Co ..	474.00	<b>Class 20:</b>	
David S. Wells .....	456.00	David Duncan & Son* ...	250.00
<b>Class 19:</b>		Bloomington Mining Co ..	277.00
David Duncan .....	592.50	David S. Wells .....	270.00

tBy lot.

*Proposals for fuel for the navy-yard, New York, under Bureau advertisement dated May 22, 1891, opened June 30, 1891.*

## Class 22:

David Duncan & Son....	\$35,928.75
Bloomington Mining Co.	36,150.00
Barber & Ziegler .....	34,377.00
Samuel G. French*.....	34,272.50
David S. Wells.....	34,923.75

## Class 23:

David Duncan & Son....	1,351.35
Bloomington Mining Co.	1,428.35
Barber & Ziegler .....	1,337.75
Samuel G. French.....	1,336.10
David S. Wells.....	1,332.45

## Class 24:

David Duncan & Son*..	19.92
Samuel G. French.....	26.00

## Class 25:

Clearfield Bituminous Corporation.....	31,400.00
David Duncan & Son* ..	29,800.00
Bloomington Mining Co.	31,256.00

## Class 25—Continued:

Barber & Ziegler.....	\$33,900.00
Samuel G. French.....	32,400.00
	33,750.00

## Class 26:

David Duncan & Son ...	7,327.20
Bloomington Mining Co*	7,092.90
Barber & Ziegler .....	7,859.70
Samuel G. French.....	7,827.75

## Class 27:

David Duncan & Son.....	917.00
Daniel Bertolet* .....	393.00
Samuel G. French.....	419.20

## Class 28:

David Duncan & Son....	560.00
J. B. Morrell & Co .....	388.00
Samuel G. French.....	300.00

## Class 29:

Samuel G. French*.....	218.00
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*Proposals for fuel for the navy-yard, League Island, Pa., under Bureau advertisement dated May 22, 1891, opened June 30, 1891.*

## Class 30:

David Duncan & Son....	\$57.50
Bloomington Mining Co*	55.00
Thos. McConnell .....	50.00
David S. Wells .....	46.10

## Class 31:

David Duncan & Son....	2,782.50
Chas. D. Norton & Co.*..	2,226.00
Bloomington Mining Co.	2,257.70
Thomas McConnell .....	2,650.00
David S. Wells .....	2,443.30

## Class 32:

David Duncan & Son....	\$143.75
Thomas McConnell*.....	125.00

## Class 33:

David Duncan & Son....	3,750.00
Chas. D. Norton & Co.*..	2,900.00
Bloomington Mining Co.	2,960.00
Thomas McConnell .....	4,250.00
West Virginia Central and Pittsburg Rwy. Co ....	3,290.00

*Proposals for fuel for the Naval Academy, Annapolis, Md., under Bureau advertisement dated May 22, 1891, opened June 30, 1891.*

## Class 34:

Wm. L. Read .....	\$1,960.00
David Duncan & Son....	2,096.00
Henry B. Myers .....	1,732.00
John Kealy .....	1,872.00
Joseph S. M. Basil*	1,712.00
John B. Flood .....	1,900.00
Bloomington Mining Co.	1,856.00
David S. Wells .....	1,888.00

## Class 35:

Wm. L. Read*†.....	688.00
Joseph S. M. Basil .....	730.00
Bloomington Mining Co.	688.00
Stephenson & Bro.....	700.00
West Virginia Central and Pittsburg Rwy. Co ....	720.00

## Class 36:

Wm. L. Read.....	980.00
David Duncan & Son....	1,048.00

## Class 36—Continued:

Henry B. Myers* .....	\$866.00
John Kealy .....	936.00
Joseph S. M. Basil .....	876.00
John B. Flood .....	950.00
Bloomington Mining Co.	928.00
David S. Wells .....	944.00

## Class 37:

Wm. L. Read* .....	14,091.00
Bloomington Mining Co.	14,370.00
Stephenson & Bro.....	14,316.00
West Virginia Central and Pittsburg Rwy. Co ....	14,190.00

## Class 38:

Henry B. Myers .....	187.00
John Kealy* .....	159.50
Joseph S. M. Basil .....	190.85
John B. Flood .....	206.25

\* Accepted.

† Decided by lot.

*Proposals for fuel for the navy-yard, Washington, D. C., under Bureau advertisement dated May 22, 1891; opened June 30, 1891.*

Class 39:		Stephenson & Bros.....	\$3, 876. 00
Wm. L. Read *	\$384. 00	Class 43:	
Johnson Bros.....	388. 00	Wm. L. Read *	25, 120. 00
Class 40:		Johnson Bros.....	27, 200. 00
Wm. L. Read *	3, 925. 00	Bloomington Mining Co..	30, 720. 00
Johnson Bros.....	4, 250. 00	Stephenson, & Bro.....	25, 840. 00
Bloomington Mining Co..	4, 800. 00	Class 44:	
Stephenson & Bros.....	4, 037. 50	Johnson Bros.....	1, 790. 00
Class 41:		Stephenson & Bro*.....	1, 735. 00
Wm. L. Read.....	3, 420. 00	Class 45:	
Johnson Bros.....	3, 892. 50	John F. Clarke *	999. 00
Bloomington Mining Co*	3, 138. 00	Johnson Bros.....	1, 050. 00
David S. Wells.....	3, 660. 00	Luman S. Brown.....	1, 150. 00
Class 42:		Daniel Bertolet.....	1, 800. 00
Wm. L. Reed*.....	3, 768. 00	Class 46:	
Johnson Bros.....	4, 080. 00	A. R. Williams.....	220. 00
Bloomington Mining Co..	4, 608. 00	Johnson Bros *.....	210. 00

*Proposals for fuel for the navy-yard, Norfolk, Va., under Bureau advertisement dated May 22, 1891; opened June 30, 1891.*

Class 47:		Pocahontas Coal Co.....	\$12, 804. 75
Nottingham & Wrenn...	\$283. 75	Bloomington Mining Co. *	12, 551. 35
David Duncan & Son*...	262. 50	E. C. Brooks.....	16, 297. 50
W. & J. Parker.....	294. 00	Class 50:	
E. C. Brooks.....	271. 00	Nottingham & Wrenn *..	1, 434. 75
Class 48:		Geo. L. Neville.....	2, 275. 00
Nottingham & Wrenn *..	1, 922. 00	Class 51:	
David Duncan & Son.....	2, 248. 75	Geo. L. Neville.....	375. 00
W. & J. Parker.....	2, 133. 75	E. C. Brooks * †.....	375. 00
E. C. Brooks.....	2, 196. 00	Class 52:	
Class 49:		Augustus H. Bass.....	396. 00
Geo. W. Taylor.....	13, 505. 10	Geo. L. Neville *.....	395. 98

*Proposals for fuel for the Naval Station, Key West, Fla., under Bureau advertisement dated May 22, 1891; opened June 30, 1891.*

Class 53:		Bloomington Mining Co. *	\$8, 220. 00
James Symington.....	\$9, 735. 00	Samuel G. French.....	8, 220. 00
* David Duncan & Son....	8, 460. 00	David S. Wells.....	8, 880. 00
E. B. Townsend.....	8, 625. 00		

*Proposals for fuel for the navy-yard, Pensacola, Fla., under Bureau advertisement dated May 22, 1891; opened June 30, 1891.*

Class 55:		Benjamin Dolphin *	\$75. 00
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*Proposals for fuel for the navy-yard, Mare Island, Cal., under Bureau advertisement dated May 22, 1891; opened June 30, 1891.*

Class 56:		Class 58:	
Husband & Brooks *.....	\$33, 960. 00	Husband & Brooks.....	\$39, 392. 70
David Duncan & Son.....	70, 000. 00	David Duncan & Son....	65, 275. 00
A. F. Barnard.....	40, 400. 00	A. F. Barnard.....	38, 393. 00
Sam'l G. French.....	41, 760. 00	Henry Rosenfeld.....	33, 961. 95
Henry Rosenfeld.....	37, 400. 00	John L. Howard, bid A..	36, 764. 00
John L. Howard, bid A..	39, 360. 00	John L. Howard, bid B..	37, 568. 50
John L. Howard, bid B..	40, 400. 00	John L. Howard, bid C..	35, 708. 50
John L. Howard, bid C..	38, 000. 00	John L. Howard, bid D*..	30, 593. 50
John L. Howard, bid D..	31, 400. 00	Class 59:	
Class 57:		Wm. Walker.....	70. 00
Wm. Walker †.....	1, 087. 50	A. F. Barnard *.....	40. 00
David Duncan & Son.....	4, 125. 00	A. Powell.....	100. 00
A. F. Barnard.....	2, 373. 75	Class 60:	
Henry Rosenfeld *.....	2, 204. 25	Wm. Walker.....	243. 75
		A. Powell *.....	225. 00
		R. J. R. Aden.....	273. 75

\* Accepted.

† By lot.

‡ Informal part of class.

*Proposals for naval supplies for the navy-yard, Portsmouth, N. H., under Bureau advertisement dated June 15, 1891; opened July 7, 1891.*

<b>Class C, sand:</b>		<b>Class P, steel:</b>	
John H. Broughton *	\$1,000.00	Thompson C. Gill & Co.	\$157.78
<b>Class E, Testing machine:</b>		Midvale Steel Co.	202.86
Riehle Brothers Testing		Rowland A. Robbins.	179.17
Machine Co*	255.25	Chas. H. Pleasants.	202.86
<b>Class F, lumber:</b>		J. Friedenstein	134.33
John H. Broughton*	100.00	S. C. Forsaith Machine Co.	198.35
<b>Class G, brass tubing:</b>		<b>Class Q, iron hooping:</b>	
Rowland A. Robbins*	80.30	Rowland A. Robbins.	426.23
Chas. H. Pleasants.	81.48	Chas. H. Pleasants*	383.09
S. C. Forsaith Machine Co.	80.64	S. C. Forsaith Machine Co.	409.27
<b>Class I, rivets, etc.:</b>		<b>Class R, paints:</b>	
Rowland A. Robbins.	1,818.11	Chas. M. Childs & Co*	570.92
Chas. H. Pleasants.	1,519.81	Chas. H. Pleasants.	610.72
Ansel W. Paine*	1,331.66	Gould & Cutler Corp'n.	589.30
<b>Class K, upholstery, etc.:</b>		Roller & Shoemaker.	602.89
Rowland A. Robbins*	554.66	<b>Class S, pipe:</b>	
Geo. L. Neville.	956.00	Thompson C. Gill.	66.00
<b>Class L, oak staves:</b>		Rowland A. Robbins.	65.00
Jos. W. Duryee*	110.60	S. C. Forsaith Machine	
<b>Class M, leather, etc.:</b>		Co*	60.00
Rowland A. Robbins.	599.40	<b>Class T, oars:</b>	
Stevenson Bros. & Co*	500.40	Rowland A. Robbins.	309.17
Geo. L. Neville.	567.00	Chas. H. Pleasants.	289.70
<b>Class N, lumber:</b>		James W. Soper*	283.68
J. W. Gaskill & Sons.	10,151.86	George L. Neville.	472.80
Joseph W. Duryee*	8,936.32	<b>Class U, files, etc.:</b>	
<b>Class O, iron:</b>		Rowland A. Robbins.	58.75
Thompson C. Gill & Co.	533.33½	James W. Soper*	50.86
Rowland A. Robbins*	380.92	Ansel W. Paine.	64.35
Chas. H. Pleasants.	595.50		
J. Friedenstein.	426.67		

*Proposals for naval supplies for the Norfolk navy-yard under Bureau advertisement, June 19, 1891; opened July 7, 1891.*

<b>Class C, pipe, etc.:</b>		<b>Class I, white pine logs:</b>	
Donegan & Swift*	\$665.57	Geo. L. Neville *	\$902.20
James W. Soper	922.47	J. W. Gaskill & Sons	1,014.00
George L. Neville.	864.79	<b>Class K, rivets:</b>	
<b>Class D, oak logs:</b>		Chas. H. Pleasants.	126.74
W. C. Cooke.	1,250.00	Wm. P. Dodson*	93.75
The Norfolk Timber Co *	925.00	Geo. L. Neville.	111.00
Geo. L. Neville.	1,250.00	<b>Class L, duck, etc.:</b>	
<b>Class E, yellow pine:</b>		Wm. P. Dodson*	37.10
W. C. Cooke*	380.00	Geo. L. Neville.	45.60
Geo. L. Neville.	423.00	<b>Class M, leather, etc.:</b>	
J. W. Gaskill & Sons.	720.00	Wm. P. Dodson.	81.00
<b>Class F, fire bricks:</b>		Geo. L. Neville*	51.75
Niemeyer & Co.	396.00	<b>Class N, locks, etc.:</b>	
Wm. P. Dodson.	428.25	Wm. P. Dodson.	1,876.04
Rowland A. Robbins *	380.40	J. H. Chesley & Co *	1,504.85
<b>Class G, tool steel:</b>		Geo. L. Neville.	1,904.93
Chas. H. Pleasants*	249.67	<b>Class O, rigging leather:</b>	
Midvale Steel Co.	249.75	Wm. P. Dodson*	48.00
Rowland A. Robbins.	267.00	Geo. L. Neville.	54.00
<b>Class H, oil:</b>		Stevenson Bros. & Co.	68.40
Chas. H. Pleasants.	44.50	<b>Class P, pumps, etc.:</b>	
Fred. B. Fiske.	42.00	James W. Soper.	2,350.75
Chas. M. Childs & Co.*	41.25	Geo. L. Neville.	2,325.00
Wm. P. Dodson.	45.00	Rowland A. Robbins*	2,139.00
Geo. L. Neville.	50.00	<b>Class Q, iron:</b>	
Stevenson Bros. & Co.	51.00	Chas. H. Pleasants.	426.15
Rowland A. Robbins.	52.00	Thompson C. Gill.	418.75

\* Accepted.

*Proposals for naval supplies for the Norfolk navy-yard, etc.—Continued.***Class Q—Continued.**

S. C. Forsaith Machine Co.....	\$416.35
Donegan & Swift.....	467.25
James W. Soper.....	368.85
Wm. P. Dodson.....	505.65
J. H. Chesley & Co *.....	346.65
Geo. L. Neville.....	398.97
Rowland A. Robbins.....	431.25
<b>Class R, paints, etc.:</b>	
Chas. H. Pleasants.....	344.25
Chas. M. Childs & Co *.....	330.00
Wm. P. Dodson.....	379.50

**Class R—Continued.**

Geo. L. Neville.....	\$365.00
Rowland A. Robbins.....	381.75
<b>Class S, water-closets:</b>	
Geo. L. Neville *.....	2, 049.25
<b>Class T, steel:</b>	
Chas. H. Pleasants.....	162.00
Geo. L. Neville *.....	144.00
<b>Class U:</b>	
Chas. H. Pleasants*.....	96.25
Chas. M. Childs & Co.....	108.25
Geo. L. Neville.....	195.00
Rowland A. Robbins.....	280.00

*Proposals for building material, etc., for the League Island navy-yard, under Bureau advertisement dated June 20, 1891; opened July 7, 1891.***Class A, drifting pins:**

Thompson C. Gill & Co..	\$270.52½
Dwight F. Walker.....	267.82
Albanus L. Smith & Co..	239.87
Jacob Shannon & Co.....	233.16
Paul J. Field, jr.....	263.15
S. C. Forsaith Machine Co.	260.45
J. H. Sternbergh & Son *.	185.82
Billany & Cochrane.....	288.95

**Class B, lime, etc.:**

Donaldson Bros. & Co....	1, 981.00
J. R. Clausen & Son†....	1, 827.50
Dwight F. Walker.....	1, 995.71
James L. Good *.....	1, 883.07½
Jacob Shannon & Co.....	2, 613.50
J. Heylin MacDonald.....	2, 015.00

**Class C, sand:**

Dwight F. Walker *.....	\$250.00
James L. Good.....	312.50
Jacob Shannon & Co.....	617.50

**Class D, spikes:**

Thompson C. Gill & Co....	76.00
Dwight F. Walker.....	82.50
Albanus L. Smith & Co..	90.00
Jacob Shannon & Co. *...	65.00
Paul J. Field, jr.....	72.00
Billany & Cochrane.....	66.00

**Class E, lumber:**

J. W. Gaskill & Sons *....	2, 771.20
Dwight F. Walker.....	3, 248.95

*Proposals for naval supplies for the navy-yard, Boston, Mass., under Bureau advertisement dated June 16, 1891; opened July 7, 1891.***Class A, lumber:**

James O. Abbot.....	\$1, 417.50
Geo. McQuesten & Co. *.	1, 012.50

**Class B, pipe, etc.:**

S. C. Forsaith Machine Co. *	100.89
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**Class C, bricks:**

Fiske, Coleman & Co * ..	30.00
Taylor P. Thompson.....	39.00
Waldo Brothers†.....	36.00
Philadelphia and Boston Face Brick Co.....	33.00

**Class D, cement:**

Fiske, Coleman & Co. * ..	\$28.08
Taylor P. Thompson.....	33.60
Waldo Brothers†.....	28.32

**Class E, fire-brick linings, etc.:**

Fiske, Coleman & Co. * ..	274.26
Rowland A. Robbins.....	364.80

*Proposals for naval supplies for the New York navy-yard, under Bureau advertisement dated June 25, 1891; opened July 14, 1891.***Class A, 2,500 gallons linseed oil:**

Fred'k B. Fiske.....	\$1, 400.00
Manhattan Oil Co. *.....	1, 397.50

**Class C, tape line, etc.:**

Ansel W. Paine.....	68.50
James W. Soper.....	81.60
Rowland A. Robbins.....	60.70
Eugene L. Maxwell*.....	51.28

**Class D, iron:**

Chas. H. Pleasants*.....	40.79
S. C. Forsaith Machine Co.	52.45
Rowland A. Robbins.....	42.74

**Class E, boiler tubes:**

Harry L. Briggs.....	\$70.00
Donegan & Swift.....	70.00
S. C. Forsaith Machine Co.	91.00
Rowland A. Robbins.....	73.50
Eugene L. Maxwell*.....	42.00

**Class G, hardware:**

Harry L. Briggs.....	601.56
Ansel W. Paine.....	837.04
J. B. Monell & Co. *.....	580.31
Rowland A. Robbins.....	593.44
Ira B. White.....	680.35

\* Accepted.

† Informal.

*Proposals for naval supplies for the New York navy-yard, etc.—Continued.*

<b>Class H, scale:</b>		<b>Class Q, drills:</b>	
Tissot & Schultz .....	\$39.34	Harry L. Briggs .....	\$148.12
Rowland A. Robbins .....	38.90	Ansel W. Paine .....	167.94
Eugene L. Maxwell* .....	32.72	Jas. W. Soper .....	155.24
<b>Class J, lumber:</b>		Donegan & Swift .....	152.05
Watson & Pittinger .....	710.00	S. C. Forsaith Machine Co. ....	158.64
Chas. E. Pell .....	709.00	Rowland A. Robbins* .....	142.90
Joseph W. Duryee* .....	650.00	Eugene L. Maxwell .....	160.00
<b>Class K, white lead, paints, etc.:</b>		<b>Class R, tools:</b>	
Chas. I. Reynolds .....	4,647.10	Harry L. Briggs .....	329.91
Chas. H. Pleasants .....	4,613.65	James W. Soper* .....	314.65
Geo. Gabbs Sons .....	5,178.99	Donegan & Swift .....	354.95
Jas. H. Taylor .....	4,444.94	Rowland A. Robbins .....	421.90
Wm. McDonagh & Co. ....	4,520.35	Eugene L. Maxwell .....	337.17
J. B. Monell & Co. ....	4,480.21	<b>Class S, gaskets:</b>	
Rowland A. Robbins .....	4,793.89	J. B. Monell & Co. ....	60.00
Chas. M. Childs & Co. ....	4,468.07	Rowland A. Robbins* .....	37.80
Ira B. White .....	4,693.71	<b>Class T, canvas:</b>	
F. W. Devoe & Co. ....	4,633.03	Tissot & Schultz .....	550.00
<b>Class L, alcohol:</b>		Rowland A. Robbins* .....	450.00
Chas. H. Pleasants* .....	536.80	<b>Class U, sewing silk:</b>	
F. W. Devoe & Co. ....	541.20	Abraham Abraham* .....	235.50
<b>Class M, tools:</b>		Tissot & Schultz .....	267.00
Harry L. Briggs .....	251.35	<b>Class V, binding:</b>	
James W. Soper .....	283.76	Abraham Abraham .....	292.00
J. B. Monell & Co.* .....	240.45	Tissot & Schultz* .....	241.50
Rowland A. Robbins .....	280.85	<b>Class W, sewing cotton:</b>	
Ira B. White .....	316.84	Abraham Abraham .....	118.50
<b>Class N, steel:</b>		Tissot & Schultz .....	128.25
Park Brother & Co.,		Wm. Wilson* .....	114.75
Lmt'd* .....	941.70	<b>Class X, buttons:</b>	
J. H. Sternbergh & Son ..	1,350.46	Abraham Abraham* .....	149.25
Benj. Atha & Illingworth		Tissot & Schultz .....	160.80
Co. ....	1,351.50	<b>Class Y, 30,000 pounds can-</b>	
S. C. Forsaith Machine Co. ....	1,412.91	dles:	
Rowland A. Robbins .....	1,306.66	Manhattan Oil Co.* .....	3,187.50
<b>Class P, fire bricks:</b>		<b>Class Z, 5,000 pairs woolen</b>	
Harry L. Briggs .....	91.87	socks:	
Rowland A. Robbins* .....	88.00	B. Z. Pippey & Co.* .....	1,625.00

*Proposals for constructor's stores for the Norfolk navy-yard, under Bureau advertisement dated June 24, 1891; opened July 14, 1891.*

<b>Class A, steel plate:</b>		<b>Geo. L. Neville .....</b>		<b>\$130.15</b>
Geo. L. Neville .....	\$198.00	<b>Class F, pumps:</b>		
Carnegie, Phipps & Co.* ..	140.25	James W. Soper* .....	47.37	
<b>Class B, angles, etc.:</b>		S. C. Forsaith Machine Co. ....	55.20	
Geo. L. Neville .....	370.20	Rowland A. Robbins .....	48.00	
Carnegie, Phipps & Co.* ..	262.23	Geo. L. Neville .....	57.00	
<b>Class D, lumber:</b>		<b>Class G, screws:</b>		
Geo. L. Neville* .....	405.60	Rowland A. Robbins* .....	22.40	
<b>Class E, water-closet supplies:</b>		Geo. L. Neville .....	24.47	
Rowland A. Robbins* .....	106.70			

*Proposals for stationery for the navy-yard, Portsmouth, N. H., under Bureau advertisement dated June 24, 1891; opened July 21, 1891.*

<b>Class 1:</b>		<b>Class 3:</b>	
Rowland A. Robbins .....	\$390.36	Rowland A. Robbins* .....	\$621.78
Sam'l Ward Co.* .....	308.98	Sam'l Ward Co. ....	659.98
<b>Class 2:</b>		<b>Class 4:</b>	
Rowland A. Robbins* .....	169.29	Rowland A. Robbins* .....	55.75
Sam'l Ward Co. ....	182.27		

\* Accepted.

† No award.

*Proposals for stationery for the navy-yard, Boston, Mass., under Bureau advertisement dated June 24, 1891; opened July 21, 1891.*

<b>Class 5:</b>		<b>Class 7:</b>	
R. A. Robbins*	\$254.85	R. A. Robbins	\$469.98
M. R. Warren	279.04	M. R. Warren	516.88
Sam'l Ward Co.	286.59	Winkley, Dresser & Co. *	407.44
<b>Class 6:</b>		Sam'l Ward Co.	479.75
R. A. Robbins	159.27	<b>Class 8:</b>	
M. R. Warren	200.60	R. A. Robbins *	67.24
Sam'l Ward Co *	137.54	M. R. Warren	83.00

*Proposals for stationery for the Torpedo Station, Newport, R. I., under Bureau advertisement dated June 24, 1891; opened July 21, 1891.*

<b>Class 9:</b>		<b>Class 11:</b>	
R. A. Robbins	\$50.50	R. A. Robbins *	\$115.63
Sam'l Ward Co*	44.24	Sam'l Ward Co.	141.90
<b>Class 10:</b>			
R. A. Robbins	139.92		
Sam'l Ward Co *	117.43		

*Proposals for the Naval Training Station, Newport, R. I., under Bureau advertisement dated June 24, 1891; opened July 21, 1891.*

<b>Class 12:</b>		<b>Class 14:</b>	
R. A. Robbins *	\$75.95	R. A. Robbins *	\$65.85
Sam'l Ward Co.	76.49	Sam'l Ward Co.	73.69
<b>Class 13:</b>			
R. A. Robbins	13.49		
Sam'l Ward Co. *	12.90		

*Proposals for stationery for naval station, New London, Conn., under Bureau advertisement dated June 24, 1891; opened July 21, 1891.*

<b>Class 15:</b>		<b>Class 17:</b>	
Rowland A. Robbins*	\$55.77	Rowland A. Robbins *	\$169.87
<b>Class 16:</b>		Sam'l Ward Co.	173.90
Rowland A. Robbins *	105.80	<b>Class 18:</b>	
Sam'l Ward Co.	118.00	Rowland A. Robbins *	18.25

*Proposals for stationery for the navy-yard, New York, under Bureau advertisement dated June 24, 1891; opened July 21, 1891.*

<b>Class 19:</b>		<b>Class 22:</b>	
Rowland A. Robbins *	\$857.05	Rowland A. Robbins ....	\$5,576.95
<b>Class 20:</b>		John M. Bulwinkle*.....	5,155.27
Rowland A. Robbins *	590.55		
<b>Class 21:</b>			
Rowland A. Robbins *	2,275.80		

*Proposals for stationery for navy-yard, League Island, Pa., under Bureau advertisement dated June 24, 1891; opened July 21, 1891.*

<b>Class 23:</b>		<b>Class 25:</b>	
Rowland A. Robbins *	\$138.41	Rowland A. Robbins *	\$448.71
<b>Class 24:</b>			
Rowland A. Robbins *	192.72		

*Proposals for stationery for the Naval Academy, Annapolis, Md., under Bureau advertisement dated June 24, 1891; opened July 21, 1891.*

<b>Class 26:</b>		<b>Class 28:</b>	
Rowland A. Robbins *	\$144.30	Rowland A. Robbins *	\$1,413.89
<b>Class 27:</b>		<b>Class 29:</b>	
Rowland A. Robbins *	768.57	Rowland A. Robbins *	257.03

\*Accepted.



*Proposals for stationery for the navy-yard, Washington, D. C., under Bureau advertisement dated June 24, 1891; opened July 21, 1891.*

Class 30:		Class 32—Continued.	
Rowland A. Robbins*....	\$288.84	John Murphy & Co.....	\$1,732.31
Class 31:		Class 33:	
Rowland A. Robbins*†..	1,540.38	Rowland A. Robbins....	508.12
John Murphy & Co.....	1,707.55	Fred. A. Smidt*.....	395.12
Class 32:		George Ryneal, jr.....	468.96
Rowland A. Robbins.....	1,644.89	Wm. Ballantyne & Sons..	462.72
Wm. Ballantyne & Sons*	1,227.50		

*Proposals for stationery for the navy-yard, Norfolk, Va., under Bureau advertisement June 24, 1891; opened July 21, 1891.*

Class 34:		Class 36:	
Rowland A. Robbins....	\$276.89	Rowland A. Robbins....	\$1,049.27
Hume & Bilisoly*.....	158.48	Hume & Bilisoly*.....	897.20
Class 35:		Class 37:	
Rowland A. Robbins....	661.68	Rowland A. Robbins*...	522.38
Hume & Bilisoly*.....	500.94	Hume & Bilisoly.....	546.20

*Proposals for stationery for the naval station, Key West, Fla., under Bureau advertisement dated June 24, 1891; opened July 21, 1891.*

Class 38:		Class 40:	
Rowland A. Robbins*...	\$10.55	Rowland A. Robbins*...	\$67.38
Class 39:			
Rowland A. Robbins*...	24.98		

*Proposals for stationery for the navy-yard, Pensacola, Fla., under Bureau advertisement dated June 24, 1891; opened July 21, 1891.*

Class 41:		Class 42—Continued.	
Rowland A. Robbins....	\$45.90	T. J. McKenzie Oerting..	\$54.85
T. J. McKenzie Oerting*	33.79	Class 43:	
Class 42:		Rowland A. Robbins....	187.49
Rowland A. Robbins*...	51.90	T. J. McKenzie Oerting*	187.35

*Proposals for stationery for the navy-yard, Mare Island, Cal., under Bureau advertisement dated June 24, 1891; opened July 21, 1891.*

Class 44:		Class 46:	
Rowland A. Robbins*....	\$418.72	Rowland A. Robbins.....	\$1,470.77
Dutton & Partridge.....	473.50	Dutton & Partridge*....	1,404.27
Payot, Upham & Co.....	492.19	Payot, Upham & Co.....	1,504.60
H. S. Crocker & Co.....	500.32	Class 47:	
Class 45:		Rowland A. Robbins.....	640.35
Rowland A. Robbins.....	554.22	Dutton & Partridge.....	609.45
Dutton & Partridge*....	509.46	Payot, Upham & Co.....	606.70
Payot, Upham & Co.....	591.02	H. S. Crocker & Co.*.....	605.70
H. S. Crocker & Co.....	539.09		

*Proposals for steam-engineering stores for the Mare Island navy-yard, under Bureau advertisement dated June 23, 1891; opened July 21, 1891.*

Class A:		Class C:	
Miller, Sloss & Scott....	\$104.00	A. S. Carman.....	\$319.00
The Huntingdon-Hopkins		Miller, Sloss & Scott*...	297.50
Co.*.....	75.68	Wm. Walker.....	350.00
Class B:		Class D:	
A. S. Carman*.....	130.00	Miller, Sloss & Scott....	50.00
Wm. Walker.....	145.00	W. F. Bowers*.....	40.00
A. Howell.....	165.00		

\* Accepted.

† Part of class informal.

*Proposals for naval supplies for the New York navy-yard, under Bureau advertisement dated July 10, 1891; opened July 28, 1891.*

<b>Class A, 5,000 yards flannel:</b>		<b>Class K, hose:</b>	
Henry T. Kent* .....	\$4,850.00	William A. Wheeler .....	\$603.00
<b>Class B, 1 Locomotive stow crane:</b>		J. B. Monell & Co .....	438.50
Morgan Engineering Co. ....	3,950.00	Gutta Percha and Rubber Manufacturing Co. ....	653.00
The Yale & Towne Manufacturing Co. ....	7,200.00	Harry L. Briggs* .....	429.50
Eugene L. Maxwell* .....	3,565.00	<b>Class L, cotton, canvas, etc.:</b>	
<b>Class C, 1 steam engine:</b>		William A. Wheeler .....	1,202.84
Niles Tool Works* .....	1,725.00	J. B. Monell & Co* .....	1,133.03
S. C. Forsaith Machine Co. ....	2,045.00	Rowland A. Robbins .....	1,344.10
<b>Class D, 1 saddle-tank locomotive:</b>		<b>Class M, brushes and general equipment supplies:</b>	
Niles Tool Works .....	3,900.00	J. B. Monell & Co* .....	4,772.03
Vulcan Iron Works* .....	3,056.00	Rowland A. Robbins .....	4,889.93
J. B. Monell & Co .....	3,795.00	Harry L. Briggs .....	5,012.94
<b>Class E, 2,000 feet hose:</b>		<b>Class N, tools:</b>	
William A. Wheeler* .....	960.00	J. B. Monell & Co .....	111.24
Revere Rubber Co .....	1,400.00	Rowland A. Robbins .....	124.36
S. F. Hayward & { Bid A. Co. .... } Bid B. ....	1,600.00	Harry L. Briggs* .....	96.26
Melville Lindsay .....	1,100.00	<b>Class O, lamps, etc.:</b>	
Rowland A. Robbins .....	1,160.00	J. B. Monell & Co* .....	168.59
Harlan P. Christie .....	1,180.00	Rowland A. Robbins .....	169.42
Gutta Percha and Rubber Manufacturing Co. ....	1,080.00	Harry L. Briggs .....	187.60
Harry L. Briggs .....	980.00	<b>Class P, leather:</b>	
Eureka Fire Hose Co .....	1,140.00	J. B. Morrell & Co. ....	263.50
<b>Class F, bunting:</b>		Rowland A. Robbins .....	266.10
William A. Wheeler .....	253.40	Harry L. Briggs .....	283.10
J. B. Monell & Co .....	226.35	Eugene L. Maxwell* .....	256.35
Rowland A. Robbins .....	243.82	<b>Class Q, tar:</b>	
Hans Hemkin .....	255.14	J. B. Morrell* .....	264.90
Tissot & Schultz* .....	219.00	Rowland A. Robbins .....	301.70
<b>Class G, looking-glass:</b>		Charles M. Childs & Co..	316.30
William A. Wheeler .....	107.94	Charles H. Pleasants .....	475.00
Rowland A. Robbins* .....	96.15	<b>Class R, lumber:</b>	
Hans Hemkin .....	110.15	Watson & Pittinger* .....	306.50
Harry L. Briggs .....	101.25	Charles E. Pell .....	319.65
<b>Class H, oil, mineral and cylinder:</b>		Joseph W. Duryee .....	398.00
Frederick B. Fiske* .....	331.80	<b>Class T, water closet:</b>	
Rowland A. Robbins .....	454.00	Rowland A. Robbins* .....	417.80
Hans Hemkin .....	495.00	<b>Class U, steam gauges:</b>	
Manhattan Oil Co .....	362.00	Rowland A. Robbins .....	188.24
<b>Class I, oil, lard, etc.:</b>		Eugene L. Maxwell* .....	121.78
Frederick B. Fiske* .....	5,466.75	<b>Class V, charcoal iron:</b>	
Rowland A. Robbins .....	5,895.75	Rowland A. Robbins .....	509.00
Manhattan Oil Co .....	5,550.63	S. C. Forsaith Machine Co.	525.00
		Harry L. Briggs* .....	472.00
		Eugene L. Maxwell .....	534.00
		Charles H. Pleasants .....	499.00

*Proposals for naval supplies for the navy-yard, Portsmouth, N.H., under Bureau advertisement dated August 1, 1891; opened August 22, 1891.*

<b>Class 1, duck canvas, etc.:</b>		<b>Class 3, brushes, glass, etc.:</b>	
Rider & Cotton .....	\$1,443.60	Rider & Cotton .....	\$987.34
N. Boynton & Co.* .....	1,165.57	Manhattan Supply Co .....	977.65
Manhattan Supply Co .....	1,288.43	Ansel W. Paine.* .....	967.85
White & Dodson .....	1,541.80	<b>Class 4, clay and kaolin:</b>	
<b>Class 2, leather:</b>		Rider & Cotton .....	21.00
Rider & Cotton .....	73.00	John H. Broughton .....	43.00
Manhattan Supply Co .....	73.00	Chas. H. Pleasants .....	40.00
Stevenson Bro. & Co.* .....	58.30	Manhattan Supply Co ...	17.80
Eugene L. Maxwell .....	63.88		

\* Accepted.

*Proposals for naval supplies for the navy-yard, Portsmouth, N. H., etc.—Continued.*

<b>Class 5:</b>		<b>Class 16, upholstery:</b>	
Rider & Cotton .....	\$49.30	Rider & Cotton .....	\$78.00
Manhattan Supply Co. ....	57.75	Manhattan Supply Co.*† ..	78.00
Ansel W. Paine .....	55.25	Stevenson Bro. & Co. ....	78.00
<b>Class 6, lumber:</b>		White & Dodson .....	84.00
John H. Broughton .....	5,339.00	<b>Class 17, hoop iron, etc.:</b>	
J. W. Gaskill & Sons .....	4,881.50	Rider & Cotton .....	106.50
Jos. W. Duryee* .....	4,584.00	Chas. H. Pleasants* .....	104.93
James & Abbot .....	6,380.00	White & Dodson .....	139.50
<b>Class 7, metals:</b>		<b>Class 18, oars:</b>	
Rider & Cotton .....	234.72	Rider & Cotton .....	135.00
Chas. H. Pleasants .....	292.37	Chas. H. Pleasants* .....	97.86
Manhattan Supply Co.* ..	220.94	James W. Soper .....	99.90
<b>Class 8, metals:</b>		White & Dodson .....	105.00
Chas. H. Pleasants* .....	706.50	<b>Class 19, waste, soap, etc.:</b>	
<b>Class 9, packing:</b>		Rider & Cotton .....	44.00
Rider & Cotton .....	50.00	Chas. H. Pleasants* .....	30.40
Manhattan Supply Co.* ..	36.00	Manhattan Supply Co. ....	34.20
Stevenson Bro. & Co. ....	56.00	Stevenson Bro. & Co. ....	44.50
<b>Class 10, paints, etc:</b>		Chas. M. Childs & Co. ....	33.86
Rider & Cotton .....	1,409.12	Ansel W. Paine .....	37.00
Chas. H. Pleasants .....	1,524.15	<b>Class 20, slate:</b>	
Gould & Cutter Corpora- tion .....	1,303.92	John W. Broughton .....	185.00
Wm. A. Wheeler .....	1,587.91	Ansel W. Paine* .....	130.00
Chas. M. Childs & Co.* ..	1,257.81	<b>Class 21, roofing tin:</b>	
James H. Taylor .....	1,276.05	Rider & Cotton* .....	170.00
White & Dodson .....	1,354.27	Manhattan Supply Co. ....	188.00
<b>Class 11, oils:</b>		Ansel W. Paine .....	200.00
Rider & Cotton .....	342.56	<b>Class 22, glass:</b>	
Chas. H. Pleasants .....	334.84	Rider & Cotton* .....	97.50
Stevenson Bro. & Co. ....	326.70	Manhattan Supply Co. ....	107.35
Chas. M. Childs & Co. ....	307.60	Gould & Cutler Corpora- tion .....	104.75
White & Dodson .....	311.56	Eugene L. Maxwell .....	99.49
Thomas P. Fiske* .....	290.04	Ansel W. Paine .....	131.50
<b>Class 12, alcohol:</b>		<b>Class 23, gas oil:</b>	
Chas. H. Pleasants* .....	144.10	Rider & Cotton .....	525.00
<b>Class 13, pipe and fittings:</b>		Gould & Cutler Corpora- tion .....	493.75
Rider & Cotton .....	708.07	<b>Class 24, coal:</b>	
Manhattan Supply Co.* ..	652.65	Wm. H. Sise* .....	92.20
Ansel W. Paine .....	762.06	<b>Class 25, ranges, etc.:</b>	
<b>Class 14, files, screws, etc.:</b>		Ansel W. Paine* .....	57.00
Rider & Cotton .....	406.61	<b>Class 26, rope:</b>	
Manhattan Supply Co.* ..	250.07	Rider & Cotton .....	122.43
Eugene L. Maxwell .....	250.33	Chas. H. Pleasants .....	114.07
Ansel W. Paine .....	363.53	Manhattan Supply Co.* ..	104.62
<b>Class 15, cordage:</b>		Ansel W. Paine .....	136.67
Manhattan Supply Co.* ..	87.20		

*Proposals for naval supplies for the navy-yard, Boston, Mass., under Bureau advertisement dated July 31, 1891; opened August 22, 1891.*

<b>Class 1, brick and sand:</b>		<b>Class 3, burlaps, etc.:</b>	
Taylor P. Thompson* .....	\$296.25	Taylor P. Thompson .....	\$613.10
Ansel W. Payne .....	378.00	Geo. L. Neville .....	647.80
Fiske Coleman & Co. ....	296.38	Manhattan Supply Co.* ..	550.10
<b>Class 2, canvass, etc.:</b>		<b>Class 4, 250 tons coke:</b>	
T. Coit Johnson .....	2,313.08	Boston Gas Light Co.* ..	1,000.00
N. Boynton & Co. ....	2,341.37	<b>Class 5, hardware:</b>	
Tissot & Schultz .....	2,361.50	Ansel W. Payne .....	2,717.78
Geo. L. Neville .....	2,369.00	S. C. Forsaith Machine Co	2,329.79
J. B. Morrell & Co.* .....	2,273.47	White & Dodson .....	2,677.64
Wm. A. Wheeler .....	2,308.25	J. B. Morrell & Co.* .....	1,835.97
Manhattan Supply Co. ....	2,404.00	Manhattan Supply Co. ....	2,272.73

\*Accepted.

†Decided by lot.

*Proposals for naval supplies for the navy-yard, Boston, Mass., etc.—Continued.*

<b>Class 6, lumber:</b>		<b>Class 12—Continued.</b>	
Ansel W. Payne .....	\$845.50	Chas. M. Childs & Co.* ..	\$523.84
J. O. Wetherbee* .....	710.30	White & Dodson .....	605.36
<b>Class 7, drills, files, etc.:</b>		Wm. A. Wheeler .....	667.27
Tissot & Schultz .....	690.01	<b>Class 13:</b>	
Ansel W. Payne .....	789.69	Chas. H. Pleasants .....	367.67
Eugene L. Maxwell* .....	558.83	Taylor P. Thompson .....	219.45
S. C. Forsaith Machine Co. ....	562.50	Gould & Cutler Corpora-	
Manhattan Supply Co. ....	571.24	tion* .....	219.20
<b>Class 8, 400 tons scrap iron:</b>		Ansel W. Payne .....	237.80
Thos. & Edward J. Butler .....	9,856.00	Geo. L. Neville .....	250.50
Ansel W. Payne* .....	8,000.00	Manhattan Supply Co. ....	273.90
Manhattan Supply Co. ....	8,680.00	<b>Class 14, valves:</b>	
<b>Class 9, Jessops steel:</b>		Ansel W. Payne* .....	34.00
Charles H. Pleasants .....	536.99	Manhattan Supply Co. ....	46.40
Ansel W. Payne .....	488.00	<b>Class 15, canvas:</b>	
P. F. McDonough .....	416.25	J. B. Morrell & Co.* ....	263.10
Sherburn & Co.* .....	381.50	Manhattan Supply Co. ....	334.20
<b>Class 10, packing and hose:</b>		<b>Class 16, belting:</b>	
Stevenson Bros. & Co. ....	505.00	Loeb Brothers .....	25.50
Boston Worm Hose &		Tissot & Schultz .....	26.40
Rubber Co. ....	433.50	Ansel W. Payne .....	36.00
Ansel W. Payne .....	732.50	Eugene L. Maxwell .....	26.70
S. C. Forsaith Machine Co. ....	545.50	S. C. Forsaith Machine Co. ....	30.00
Page Belting Co. ....	390.38	Geo. L. Neville .....	27.00
Manhattan Supply Co.* ..	343.00	Page Belting Co.* .....	22.80
<b>Class 11, oils:</b>		Manhattan Supply Co. ....	25.20
Charles H. Pleasants .....	925.20	<b>Class 17, alcohol, pipe, etc.:</b>	
Taylor P. Thompson .....	875.82	Ansel W. Payne .....	137.92
W. A. Wood & Co.* .....	797.60	S. C. Forsaith Machine Co. ....	136.44
Stevenson, Bro. & Co. ....	935.30	Manhattan Supply Co.* ..	128.88
Manhattan Oil Co. ....	878.06	<b>Class 18, drawing material:</b>	
Ansel W. Payne .....	1,005.00	Wadsworth, Howland &	
Thos. P. Fiske .....	803.75	Co.t .....	48.34
Manhattan Supply Co. ....	1,042.82	Tissot & Schultz .....	63.11
<b>Class 12, paints, etc.:</b>		Taylor P. Thompson* ..	48.41
Chas. H. Pleasants .....	600.93	Manhattan Supply Co. ....	48.98
E. F. King & Co. ....	547.52	<b>Class 19, 25 tons pig iron:</b>	
Gould & Cutler Corpora-		James Symington .....	500.00
tion .....	562.50	Ansel W. Payne .....	550.00
Wadsworth, Howland &		S. C. Forsaith Machine	
Co. ....	576.91	Co.* .....	499.00
James H. Taylor .....	562.88	Manhattan Supply Co. ....	517.50

*Proposals for naval supplies for the Naval Training Station, Newport, R. I., under Bureau advertisement, July 24, 1891; opened August 22, 1891.*

<b>Class 1, brushes, screws, etc.:</b>		<b>Class 5, usndurian and felt-ing:</b>	
Manhattan Supply Co.* ..	\$240.72	Stevenson Bros. & Co.* ..	\$36.50
Ansel W. Paine .....	254.81	Manhattan Supply Co. ....	44.50
<b>Class 2, charcoal, waste, etc.:</b>		Tissot & Schultz .....	57.50
Ansel W. Paine .....	259.00	Ansel W. Paine .....	40.50
Chas. H. Pleasants* .....	240.25	<b>Class 6, paints:</b>	
<b>Class 3, belting:</b>		Gould & Cutler Corpora-	
Stevenson Bros. & Co. ....	43.50	tion .....	548.32
Loeb Brothers .....	26.87	Chas. M. Childs & Co.* ..	434.06
Manhattan Supply Co. ....	26.50	James H. Taylor .....	469.18
S. C. Forsaith M'ch. Co. ..	27.18	Ansel W. Paine .....	741.39
Page Belting Co.* .....	23.70	Hans Hanniken .....	820.82
Ansel W. Paine .....	35.88	Chas. H. Pleasants .....	709.09
Hans Hanniken .....	70.25	<b>Class 7, pipe and fittings:</b>	
<b>Class 4, metals:</b>		Manhattan Supply Co. ....	224.76
Manhattan Supply Co.* ..	68.60	S. C. Forsaith M'ch. Co.* ..	211.09
Ansel W. Paine .....	123.70	Ansel W. Paine .....	302.32

\*Accepted.

†Informal.

*Proposals for naval supplies for the Naval Training Station, Newport, R. I., etc.—Cont'd.*

Class 8, files, etc:		Class 11, cement, clay, and brick:	
Manhattan Supply Co...	\$67.85	Manhattan Supply Co.*	\$34.95
Tissot & Schultz*	50.00	Ansel W. Paine.....	55.50
Ansel W. Paine.....	69.03	Class 13, lumber:	
Class 9, steel:		Ansel W. Paine*.....	115.00
Ansel W. Paine*.....	33.92	Class 15, 25 gallons alcohol:	
Class 10:		Hans Hanniker.....	74.75
Manhattan Supply Co.*..	108.25	Chas. H. Pleasants*.....	68.00
Tissot & Schultz.....	170.75		
Ansel W. Paine.....	128.84		

*Proposals for naval supplies for the New York navy-yard under Bureau advertisement July 25, 1891; opened August 22, 1891.*

Class 1, harness material:		Class 11, drawing instruments, etc.:	
Tissot & Schultz.....	\$157.13	Henry Weinbagan.....	\$131.50
White & Dodson.....	226.80	Tissot & Schultz.....	129.00
Manhattan Supply Co.*..	152.54	Manhattan Supply Co.*..	119.70
Class 2, brooms, brushes, etc:		Class 12, lamps, etc.:	
Harry L. Briggs.....	509.09	Wm. Porter's Sons *.....	2,698.42
White & Dodson.....	751.40	Manhattan Supply Co....	2,893.14
J. B. Morrell & Co.*.....	434.82	Class 13, metals:	
Manhattan Supply Co....	534.92	Colwell Lead Co.*.....	623.77
Class 3, tools:		Class 14, hose, etc.:	
Henry L. Wakeman.....	980.34	Wm. A. Wheeler.....	735.00
Tissot & Schultz.....	931.58	Revere Rubber Co.....	720.00
Higgins Bros.....	1,001.55	Page Belting Co.....	807.50
Eugene L. Maxwell *.....	890.68	Harry L. Briggs.....	650.00
Harry L. Briggs.....	909.38	Commonwealth Rubber Co *.....	595.00
White & Dodson.....	1,003.46	Manhattan Supply Co....	640.00
Manhattan Supply Co....	943.32	Class 15, alcohol:	
Class 4, iron:		Charles H. Pleasants *... ..	121.00
Charles H. Pleasants....	251.00	Class 16:	
J. H. Sternbergh & Son * ..	136.50	Charles H. Pleasants....	568.02
Manhattan Supply Co....	173.00	Manhattan Supply Co.*..	477.50
Class 5, pipe and fittings:		Class 17, stationery:	
Colwell Lead Co.....	2,563.17	Manhattan Supply Co.*..	374.10
Donegan & Swift.....	2,550.78	Class 18, bunting:	
Harry L. Briggs.....	2,466.91	Tissot & Schultz.....	2,875.15
Henry McShane Manufac-		Wm. A. Wheeler.....	3,201.50
turing Co.*.....	2,270.37	J. B. Morrell & Co.....	3,108.40
Manhattan Supply Co....	2,638.43	Manhattan Supply Co.*..	2,769.72
Class 6, lumber:		Class 19, thread, etc.:	
Chas. E. Pell.....	6,424.80	Tissot & Schultz *.....	308.74
James Bigler.....	5,797.27	Manhattan Supply Co....	324.44
Russell Johnson.....	5,642.00	Class 20, raven's duck:	
Higgins Bros.*.....	5,460.28	J. B. Morrell & Co.....	121.00
Jos. W. Duryee.....	5,915.80	Manhattan Supply Co.*..	118.00
Watson & Pittinger....	5,572.00	Class 21, spokes, hubs, etc.:	
Class 7, paints:		Harry L. Briggs.....	92.36
Charles H. Pleasants.....	1,614.30	Manhattan Supply Co.*..	71.60
Wm. McDonagh & Co.*..	1,545.30	Class 22, leather, etc.:	
Wm. A. Wheeler.....	1,980.65	Eugene L. Maxwell.....	177.40
James H. Taylor.....	1,671.05	Page Belting Co.*.....	147.80
Chas. M. Childs & Co....	1,582.30	Manhattan Supply Co....	177.25
White & Dodson.....	1,581.70	Class 23, 10,000 gallons oil, L. and B.:	
Class 8, bolts, nuts, and washers:		Thomas P. Fisk *.....	5,750.00
J. H. Sternbergh & Son * ..	253.84	Geo. B. Hewlett.....	6,300.00
J. B. Morrell & Co.....	257.76	James Macbeth & Co.....	6,800.00
Manhattan Supply Co....	326.85	Manhattan Supply Co....	7,900.00
Class 9, brick, cement, etc.:		Wm. F. Ford.....	6,775.00
Harry L. Briggs.....	174.50	Class 24, 10,000 pounds ingot copper:	
Manhattan Supply Co.*..	141.80	Charles H. Pleasants....	1,417.12
Class 10, canvas and cordage:		Manhattan Supply Co.*..	1,327.00
Harry L. Briggs.....	434.38		
J. B. Morrell & Co.....	500.65		
Manhattan Supply Co.*..	399.10		

\* Accepted.

*Proposals for naval supplies for the New York navy-yard, etc.—Continued.*

Class 25, 1,000 gallons cylinder:		Class 25—Continued.	
Thomas P. Fisk * .....	\$325.00	James Macbeth & Co.....	\$500.00
Geo. B. Hewlett.....	370.00	Vacuum Oil Co.....	650.00
		Wm. F. Ford.....	845.00

*Proposals for naval supplies for League Island navy-yard, under Bureau advertisement dated July 29, 1891; opened August 22, 1891.*

Class A, stone blocks:		Class L—Continued.	
Manhattan Supply Co... \$25,312.91		Manhattan Supply Co... \$336.86	
Wm. Turner ..... 35,518.59		Jacob Shannon & Co.... 265.26½	
Michael O'Rourke * †.... 19,208.37		White & Dodson ..... 267.32	
Class B, curtains:		Dwight F. Walker..... 530.82	
Clarkson Clothier*..... 195.60		Paul J. Field, jr ..... 601.39	
Class C, belting:		Class M, cloth, etc.:	
Stevenson Bros. & Co... 1,450.00		Clarkson Clothier *..... 85.54	
Chas. J. Field..... 963.00		Class N, charcoal, etc.:	
Manhattan Supply Co... 910.00		Charles H. Pleasants..... 42.85	
Hans Haniken ..... 1,090.40		Chas. J. Field ..... 34.64	
Jacob Shannon & Co..... 1,034.10		Chas. M. Childs & Co.... 56.50	
Tissot & Schultz..... 877.00		Jacob Shannon & Co.* .. 28.00	
Page Belting Co.*..... 830.00		Paul J. Field, jr ..... 40.60	
Loeb Brothers ..... 873.00		Class I, solder, tin, and iron:	
Dwight F. Walker ..... 1,261.00		Chas. H. Pleasants..... 96.00	
S. C. Forsaith Machine Co..... 918.40		Chas. J. Field *..... 94.63	
Class D, bolts, nuts, etc.:		Jacob Shannon & Co ..... 95.70	
Charles H. Pleasants.... 426.20		Dwight F. Walker..... 98.50	
J. H. Sternbergh & Son . 124.46		Paul J. Field, jr ..... 108.00	
Chas. J. Field..... 120.10		Class Q, paint:	
Jacob Shannon & Co..... 123.99		Chas. H. Pleasants..... 195.67	
White & Dodson * ..... 119.22		Louis U. Bean & Co..... 200.22	
Dwight F. Walker ..... 184.92		Chas. M. Childs & Co.* .. 184.10	
Paul J. Field, jr ..... 144.18		Hans Haniken ..... 264.90	
Class E, cement:		Jacob Shannon & Co ..... 217.51	
Manhattan Supply Co... 237.80		White & Dodson..... 203.60	
Hans Haniken *..... 236.98		Dwight F. Walker ..... 226.90	
Anthony Meng †..... 287.00		Class R, alcohol:	
Class G, stone, bricks, and sand:		Chas. H. Pleasants..... 13.25	
Michael O'Rourke..... 108.75		Lewis U. Bean & Co..... 13.50	
Class H, terra cotta, etc.:		Jacob Shannon & Co * .. 12.92	
Manhattan Supply Co... 678.52		Class S, grates, etc.:	
J. R. Clausen & Son *... 493.21		Chas. J. Field *..... 17.66	
Michael O'Rourke..... 670.68		Jacob Shannon & Co.... 28.62	
Class I, stationery:		Class T, flies, etc.:	
Manhattan Supply Co.* .. 132.65		Chas. J. Field *..... 32.32	
J. E. Magee ..... 168.71		Jacob Shannon & Co.... 33.57	
Class K, wire, etc.:		White & Dodson ..... 40.75	
Charles J. Field*..... 34.22		Paul J. Field, jr ..... 52.20	
Jacob Shannon & Co..... 37.73		Class U, pulleys:	
White & Dodson ..... 96.35		Geo. V. Cresson..... 531.49	
Class L, rivets, bolts, nails, etc.:		S. C. Forsaith Machine Co..... 478.82	
Charles J. Field* ..... 225.67			

*Proposals for naval supplies for the Naval Academy, Annapolis, Md., under Bureau advertisement dated July 30, 1891; opened August 22, 1891.*

Class 1, nails, screws, etc.:		Class 3, tools, etc.:	
J. H. Chesley & Co *..... \$1,084.37		J. H. Chesley & Co *..... \$132.76	
White & Dodson..... 1,527.72		Tissot & Schultz..... 178.33	
Hans Hanneken..... 3,416.42		White & Dodson..... 229.20	
Anderson & Ireland..... 1,390.88		Harry L. Briggs..... 180.65	
R. R. Magruder & Co.... 1,317.88		Anderson & Ireland..... 256.00	
Class 2, lumber:		Class 4, iron:	
Wm. D. Gill & Son * .... 2,286.50		John Kealy..... 126.10	

\* Accepted. † Cancelled. ‡ Informal.

*Proposals for naval supplies for the Naval Academy, Annapolis, Md., etc.—Continued.*

Class 4—Continued.		Class 13—Continued.	
White & Dodson *	\$122.15	J. H. Chesley & Co.*	\$164.80
Chas. H. Pleasants	125.10	White & Dodson	403.60
Class 5, paints, etc.:		Class 14, canvas, cord, etc.:	
Solomon King	1,412.65	White & Dodson *	240.90
Chas. M. Childs & Co.	1,312.05	Class 15, hose, packing, etc.:	
White & Dodson	1,332.73	Reuter & Mallory	320.50
James H. Taylor	1,342.64	Wm. C. Codd	289.75
Chas. H. Pleasants*	1,273.07	White & Dodson	379.00
Class 6, soap, etc.:		Revere Rubber Co.	265.20
John Kealy	213.00	Harry L. Briggs *	209.45
Solomon King	182.00	Class 16, alcohol:	
Stevenson, Bro. & Co.	241.50	John Kealy	63.75
White & Dodson	191.20	Solomon King*	60.00
Chas. H. Pleasants*	159.97	Class 18, 70,000 bricks:	
Class 7, lamps, etc.:		John Kealy *	647.50
Tissot & Schultz *	176.70	Chas. H. Classen	735.00
Class 8, metals:		Hans Hannekin	2,730.00
John Kealy	394.27	Class 19, 250 piles:	
J. H. Chesley & Co.*	356.14	John Kealy	1,000.00
White & Dodson	460.40	Nathaniel Clow. { Bid A.	750.00
Class 10, plaster, cement, etc.:		{ Bid B*	850.00
John Kealy	951.50	Class 22, 200 gallons lard oil:	
Chas. H. Classen *	741.50	John Kealy	126.00
Hans Hanneken	1,066.50	Solomon King	110.00
Class 11, glass:		Stevenson, Bro. & Co.	120.00
John Kealy	256.00	Wm. C. Codd	118.00
Solomon King	186.00	White & Dodson	118.00
Hans Hannekin	194.35	Thomas P. Fisk	114.00
R. R. Magruder*	184.30	Chas. H. Pleasants	118.00
Class 12, pipe, valves, etc.:		R. R. Magruder & Co.*†	110.00
Reuter & Mallory	1,553.96	Class 23, cordage:	
Wm. C. Codd *	1,411.23	John Kealy	391.25
Class 13, grates, etc.:		White & Dodson *	285.80
B. C. Bibb Stove Co	220.10	S. C. Forsaith Machine	
		Co.†	134.71
		Hans Hannekin	358.75

*Proposals for naval supplies for the navy-yard, Mare Island, Cal., under Bureau advertisement dated July 27, 1891; opened August 22, 1891.*

Class 1, 12,300 pounds flour:		Class 6, 24,125 pounds sugar:	
Wm. Haas*	\$399.75	T. H. Dowling	\$1,326.87
Class 2, 2,322 pounds beans:		Coghill & Kohn	1,394.42
T. H. Dowling*	638.31	Herman Levi	1,311.49
Coghill & Kohn	696.60	Myer Ehrman*	1,285.86
Herman Levi	647.82	Wm. Haas	1,326.87
Myer Ehrman	644.35	Class 7, 906 gallons sirup:	
Wm. Haas	719.82	T. H. Dowling	267.72
Class 3, 2,000 pounds raisins:		Herman Levi { bid A†	181.20
T. H. Dowling*	95.00	{ bid B	253.68
Coghill & Kohn	130.00	Myer Ehrman*	249.15
Herman Levi { bid A	105.00	Wm. Haas	271.80
{ bid B	150.00	Class 8, 1,078 gallons vinegar:	
Myer Ehrman	140.00	T. H. Dowling	137.44
Wm. Haas	100.00	Herman Levi { bid A†	123.97
Class 4, 1,000 pounds currants:		{ bid B	167.09
Coghill & Kohn	120.00	Myer Ehrman*	154.75
Herman Levi	84.00	Wm. Haas	315.60
Myer Ehrman	125.00	Class 9, 3,000 pounds salmags:	
Wm. Haas	90.00	Coghill & Kohn*	297.00
Class 5, 1,820 pounds tea:		Herman Levi	290.10
T. H. Dowling*	600.60	Myer Ehrman	285.00
Coghill & Kohn	746.20	Wm. Haas	315.60
Herman Levi	764.40	Class 10, iron:	
Myer Ehrman	637.00	Miller, Sloss & Scott	
Wm. Haas	910.00		

†Decided by lot.

\*Informal.

*Proposals for naval supplies for the navy-yard, Mare Island, Cal., etc.—Continued.*

<b>Class 11, Burden rivets:</b>		<b>Class 29, drills, etc.:</b>	
Wm. R. S. Foye* .....	\$48. 00	Wm. R. S. Foye .....	\$379. 18
Miller, Sloss & Scott .....	72. 00	Eugene L. Maxwell† .....	243. 78
<b>Class 12, stationery:</b>		<b>Class 30, steel:</b>	
Sam'l B. Welch .....	592. 21	Miller, Sloss & Scott, in-	346. 98
Payot, Upham & Co* .....	565. 79	corporated* .....	
<b>Class 13, 100 gallons oil cyl-</b>		<b>Class 31, iron:</b>	
<b>inder:</b>		Wm. R. S. Foye .....	497. 13
Chas. M. Yates .....	89. 00	Miller, Sloss & Scott, in-	477. 84
F. N. Woods .....	60. 00	corporated* .....	
J. N. Knowles .....	60. 00	<b>Class 32, metals:</b>	
Harry B. Willis .....	65. 00	Manhattan Supply Co .....	3, 802. 18
Taylor, Nason & Co .....	55. 00	Miller, Sloss & Scott* .....	3, 442. 12
Manhattan Oil Co* .....	45. 00	<b>Class 33, pig iron:</b>	
<b>Class 14, oils, etc.:</b>		A. S. Carman* .....	947. 50
F. N. Woods .....	2, 919. 00	Miller, Sloss & Scott, in-	965. 00
J. N. Knowles* .....	2, 685. 50	corporated .....	
Taylor, Nason & Co .....	2, 936. 00	<b>Class 34, packing, etc.:</b>	
Manhattan Oil Co .....	2, 921. 25	Wm. R. S. Foye .....	2, 424. 67
<b>Class 15, hose:</b>		W. F. Bowers .....	2, 868. 25
W. F. Bowers .....	720. 50	Manhattan Supply Co* .....	1, 024. 70
Harry L. Briggs* .....	413. 32	Miller, Sloss & Scott, in-	1, 928. 80
S. C. Forsaith Machine Co. ....	1, 015. 32	corporated .....	
<b>Class 16, canvas duck:</b>		<b>Class 35, hose, rubber, etc.:</b>	
Manhattan Supply Co. ....	1, 062. 43	W. F. Bowers .....	935. 50
<b>Class 17, brushes, etc.:</b>		Harry L. Briggs* .....	512. 20
Louis E. Lake .....	6, 937. 72	S. C. Forsaith Machine	891. 50
Harry L. Brigg* .....	4, 038. 92	Co .....	
Manhattan Supply Co. ....	4, 393. 54	<b>Class 36, paints:</b>	
<b>Class 18, tools:</b>		Chas. M. Yates* .....	1, 486. 53
Harry L. Briggs* .....	77. 51	F. N. Woods .....	1, 497. 04
<b>Class 19, lanterns, etc.:</b>		Chas. H. Pleasants .....	1, 811. 56
Harry L. Briggs* .....	139. 23	Taylor, Nason & Co .....	1, 526. 21
Manhattan Supply Co. ....	154. 05	<b>Class 37, alcohol:</b>	
<b>Class 20, chamois skins:</b>		F. N. Woods* .....	216. 00
Louis E. Lake* .....	167. 50	Chas. H. Pleasants .....	269. 10
Eugene L. Maxwell .....	179. 25	<b>Class 38, pipe, valves, etc.:</b>	
Manhattan Supply Co. ....	169. 00	Wm. R. S. Foye* .....	1, 107. 44
<b>Class 21, tar, coal, etc.:</b>		Oscar J. Backus .....	1, 495. 13
Chas. M. Yates .....	301. 50	Miller, Sloss & Scott, in-	1, 219. 68
Louis E. Lake .....	446. 00	corporated .....	
Chas. H. Pleasants .....	488. 00	<b>Class 39, stationery:</b>	
Abraham Powell .....	346. 50	H. S. Crocker & Co* .....	176. 00
A. S. Carman .....	371. 00	Samuel B. Welch .....	178. 50
<b>Class 22, blocks:</b>		Payot, Upham & Co .....	183. 10
Eugene L. Maxwell .....	94. 55	<b>Class 40, tools, etc.:</b>	
S. C. Forsaith Machine		Wm. R. S. Foye* .....	831. 91
Co .....	117. 00	James W. Soper .....	915. 51
Miller, Sloss & Scott* .....	74. 80	Miller, Sloss & Scott .....	851. 17
<b>Class 23, nuts, rivets, etc.:</b>		<b>Class 41:</b>	
Eugene L. Maxwell .....	223. 31	Wm. R. S. Foye .....	347. 00
Miller, Sloss & Scott* .....	199. 42	F. N. Woods .....	336. 65
<b>Class 24, brooms, brushes, etc.:</b>		Chas. H. Pleasants .....	418. 54
Miller, Sloss & Scott* .....	986. 54	Miller, Sloss & Scott*† .....	336. 65
<b>Class 25, cement, etc.:</b>		<b>Class 42, 1,500 gallons oil L. &amp; B.:</b>	
Abraham Powell .....	314. 50	Chas. M. Yates .....	1, 035. 00
A. S. Carman* .....	298. 50	F. N. Woods .....	1, 425. 00
<b>Class 26, cordage, etc.:</b>		J. N. Knowles .....	1, 425. 00
Louis E. Lake* .....	124. 45	Manhattan Oil Co.* .....	1, 020. 00
<b>Class 27, belting, etc.:</b>		<b>Class 43:</b>	
Wm. R. S. Foye* .....	55. 55	Chas. M. Yates .....	534. 00
W. F. Bowers .....	74. 50	F. N. Woods .....	360. 00
<b>Class 28, lumber:</b>		J. N. Knowles .....	360. 00
Abraham Powell* .....	1, 346. 55	Harry B. Willis .....	360. 00
A. S. Carman .....	1, 354. 50	Manhattan Oil Co.* .....	270. 00

\* Accepted.

† Informal.

; Decided by lot.



*Proposals for naval supplies for the navy-yard, Norfolk, Va., under Bureau advertisement July 28, 1891; opened August 25, 1891.*

<b>Class 1, nuts:</b>		<b>Class 12, 2,000 bbls. cement:</b>	
George L. Neville	\$75.00	George L. Neville	\$5,600.00
Henry Walke	80.00	Niemeyer & Co.*	5,350.00
White & Dodson	137.50	Manhattan Supply Co.	5,460.00
E. V. White & Co.	109.40	<b>Class 13, 1,800 cubic yards</b>	
Manhattan Supply Co.	115.00	<b>stone:</b>	
<b>Class 2, steel bars and plates:</b>		George L. Neville	4,761.00
George L. Neville	2,326.40	Manhattan Supply Co.	4,140.00
Carnegie, Phipps & Co.*	946.08	Richmond Granite Co.*	3,870.00
<b>Class 3, lenses:</b>		John J. Donovan	5,346.00
Benjamin H. Shoemaker*	524.41	<b>Class 14, gravel and sand:</b>	
George L. Neville	696.70	George L. Neville	449.90
E. V. White & Co.	578.34	<b>Class 15, lumber:</b>	
Manhattan Supply Co.	665.60	W. C. Cooke	2,057.00
Holbrook Bros.	592.80	George L. Neville	1,455.52
William Porter's Sons	739.60	Lewis H. Hoagland*	1,420.05
<b>Class 2, boiler rivets:</b>		Norfolk Timber Co.	1,422.84
George L. Neville	23.48	<b>Class 16, brushes, etc., nails,</b>	
White & Dodson	41.09	<b>and screws:</b>	
Chas. H. Pleasants	33.76	George L. Neville	1,688.26
<b>Class 5, screws:</b>		White & Dodson	1,803.89
Geo. L. Neville	5.96	Harry L. Briggs*	1,551.86
Henry Walke	7.80	Manhattan Supply Co.	1,784.41
White & Dodson*	4.60	<b>Class 17, cement, etc.:</b>	
Chas. H. Pleasants	5.36	George L. Neville*	609.00
E. V. White & Co.	5.44	Charles H. Pleasants	713.25
<b>Class 6, steel:</b>		Niemeyer & Co.	617.00
Geo. L. Neville	333.06	Manhattan Supply Co.	679.60
Carnegie, Phipps & Co.*	198.80	<b>Class 18, drills, taps, etc.:</b>	
<b>Class 7, 50 tons pig iron:</b>		George L. Neville	536.12
Geo. L. Neville	962.50	White & Dodson	624.41
James Symington	995.00	James W. Soper	573.17
Manhattan Supply Co.	1,011.50	William C. Codd	655.92
<b>Class 8, packing:</b>		Harry L. Briggs	580.03
Geo. L. Neville	74.70	Manhattan Supply Co.	721.14
Henry Walke*	67.50	<b>Class 19, tool steel:</b>	
White & Dodson	70.00	George L. Neville	2,236.50
Chas. H. Pleasants	400.00	J. Friedenstein	2,493.80
Stevenson, Bro. & Co.	135.00	Midvale Steel Co.*	1,869.00
Harry L. Briggs	75.00	Carpenter Steel Co.	2,221.50
Manhattan Supply Co.	90.00	<b>Class 20, metals:</b>	
Page Belting Co.	91.80	Geo. L. Neville*	1,025.19
Wm. A. Wheeler	100.00	White & Dodson	1,043.43
<b>Class 9, oil:</b>		Manhattan Supply Co.	1,066.98
Geo. L. Neville	90.00	<b>Class 21, 500 gallons oil, cylinder:</b>	
Henry Walke	105.00	Thos. P. Fisk	200.00
White & Dodson*	89.00	Geo. L. Neville	150.00
Chas. H. Pleasants	99.00	Henry Walke	200.00
Chas. M. Childs & Co.	95.45	White & Dodson	190.00
Wm. C. Codd	98.00	Chas. M. Childs & Co.	169.37
E. V. White & Co.	90.00	Wm. C. Codd*	125.00
Stevenson, Bro. & Co.	111.00	E. V. White & Co.	240.00
<b>Class 10, pipe and fittings:</b>		Stevenson, Bro. & Co.	320.00
Geo. L. Neville*	597.43	<b>Class 22, oil, grease, etc.:</b>	
Wm. C. Codd	1,527.49	Thos. P. Fisk	440.63
E. V. White & Co.	738.27	Geo. L. Neville*	375.25
Manhattan Supply Co.	178.98	Henry Walke	386.00
<b>Class 11, 700 pounds waste:</b>		White & Dodson	423.00
George L. Neville	70.00	Chas. M. Childs & Co.	545.25
Henry Walke	63.00	Wm. C. Codd	469.00
White & Dodson	62.30	E. V. White & Co.	376.50
Charles H. Pleasants*	61.25	Stevenson, Bro. & Co.	393.00
Charles M. Childs & Co.	71.75	Manhattan Supply Co.	460.00
William C. Codd	66.50	<b>Class 23, paints:</b>	
E. V. White & Co.	70.00	Geo. L. Neville	6,012.90
Stevenson, Bro. & Co.	87.50	White & Dodson	3,705.55
Manhattan Supply Co.	65.90		

\*Accepted.

†Informal.

*Proposals for naval supplies for the navy-yard, Norfolk, Va., etc.—Continued.*

## Class 23—Continued.

Chas. H. Pleasants .....	\$11,402.35
James H. Taylor .....	3,654.95
Chas. M. Childs & Co.* ..	3,649.75
Wm. A. Wheeler .....	4,486.55

## Class 24, tools:

Geo. L. Neville .....	1,967.12
White & Dodson* .....	1,900.55
Manhattan Supply Co .....	2,070.31

## Class 25, files:

Geo. L. Neville .....	558.99
Jas. W. Soper .....	531.65
Wm. C. Codd .....	601.32
Harry L. Briggs* .....	522.78
Manhattan Supply Co .....	576.84

## Class 26:

Geo. L. Neville .....	306.90
White & Dodson .....	318.50
Chas. H. Pleasants .....	383.46
Manhattan Supply Co .....	457.60

## Class 27, rubber, etc.:

Geo. L. Neville .....	946.72
Melville Lindsay .....	901.79
Manhattan Supply Co .....	1,005.11
Page Belting Co .....	449.87
Wm. A. Wheeler* .....	426.32

## Class 28, rivets:

Geo. L. Neville .....	438.58
White and Dodson* .....	377.25

## Class 29, cloth, etc.:

Geo. L. Neville* .....	311.35
White & Dodson .....	384.00
Manhattan Supply Co .....	343.50

## Class 30, chairs:

Geo. L. Neville* .....	95.00
White & Dodson .....	112.50

## Class 31, Glass:

Geo. L. Neville .....	223.50
E. V. White & Co .....	183.50
Manhattan Supply Co .....	206.70
Holbrook Bros* .....	165.15

## Class 32, belting, etc.:

Geo. L. Neville .....	1,785.05
Henry Walke .....	1,696.75
E. V. White & Co .....	1,532.40
Stevenson Bro. & Co .....	2,632.12
Manhattan Supply Co .....	1,973.15
Page Belting Co* .....	1,238.16

## Class 33, lumber:

Geo. L. Neville .....	1,367.50
Chas. E. Pell .....	1,162.50

## Class 34, pine lumber:

Geo. L. Neville .....	\$4,530.00
John C. Emmerson .....	4,879.00
J. W. Gaskill & Sons .....	4,184.00

## Class 35, walnut, cherry, etc.:

Geo. L. Neville .....	1,532.50
Chas. E. Pell* .....	1,063.25
J. W. Gaskill & Sons .....	1,297.75

## Class 36, juniper and

## Spruce:

Geo. L. Neville .....	1,375.00
J. W. Gaskill & Sons* .....	1,270.00

## Class 37, centering machine:

Geo. L. Neville .....	240.00
Manhattan Supply Co.* ..	180.00

## Class 38, planing machine:

Geo. L. Neville .....	2,690.00
Wm. Sellers & Co., incor- porated* .....	2,176.00

## Class 39, iron:

Geo. L. Neville* .....	639.00
White & Dodson .....	773.50
Chas. H. Pleasants .....	787.25
E. V. White & Co .....	639.93
Manhattan Supply Co .....	743.30

## Class 40, steel plates:

Geo. L. Neville .....	1,635.00
Carnegie, Phipps & Co* ..	710.00

## Class 41, five tons pig iron:

Geo. L. Neville* .....	99.50
Manhattan Supply Co .....	104.50

## Class 42, alcohol, etc.:

Chas. H. Pleasants* .....	127.90
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## Class 43, basins, etc.:

Geo. L. Neville .....	265.70
White & Dodson* .....	208.40
Manhattan Supply Co .....	236.00

## Class 44, crucibles:

Geo. L. Neville .....	48.50
Chas. H. Pleasants .....	47.50
Jas. W. Soper* .....	39.40
Wm. C. Codd .....	50.00
E. V. White & Co .....	45.00
Manhattan Supply Co .....	45.00

## Class 45, pipe, tubing, etc.:

Geo. L. Neville .....	722.67
E. V. White & Co .....	580.03
Manhattan Supply Co* .....	539.25

*Proposals for naval supplies for the navy-yard, Boston, Mass., under Bureau advertisement, dated August 19, 1891; opened September 8, 1891.*

## Class 1:

Isaac Blair & Co .....	\$485.00
John Cavanaugh & Son ..	400.00

## Class 2:

Manhattan Supply Co .....	152.95
Taylor P. Thompson* .....	142.15

## Class 3:

Fiske, Coleman & Co* .....	43.60
Taylor P. Thompson .....	57.00

## Class 4:

Manhattan Supply Co* ..	228.33
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\*Accepted.

## Class 5:

Manhattan Supply Co* ..	\$30.60
Taylor P. Thompson .....	31.80

## Class 6:

James H. Taylor .....	660.80
Taylor P. Thompson .....	788.83
Gould & Cutler Corp'n ..	643.36
E. & F. King .....	648.07
Chas. M. Childs & Co* ..	625.94

## Class 7:

Ansel W. Paine* .....	176.85
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†Decided by lot.

*Proposals for naval supplies for the navy-yard, Boston, Mass., etc.—Continued.*

Class 8:		Class 13:	
Hans Hemken.....	\$54.50	Nightengal & Childs....	\$93.75
Manhattan Supply Co.....	37.50	S. C. Forsaith Machine	
Taylor P. Thompson*.....	16.63	Company*.....	84.00
Class 9:		Class 14:	
Hans Hemken.....	91.48	Taylor P. Thompson.....	75.00
Gould & Cutler Corp'n..	87.00	Gould & Cutler Corp'n*..	75.00
Class 10:		Class 15:	
James & Abbott*.....	\$748.00	W. A. Wood & Co.....	64.30
Class 11:		Frederick B. Fiske*.....	60.00
S. C. Forsaith Machine		Taylor P. Thompson.....	71.40
Company*.....	951.39	Chas. M. Childs & Co....	66.07
Class 12:		Class 16:	
Manhattan Supply Co*†..	48.00	Hans Hemken.....	206.80
S. C. Forsaith Machine		Manhattan Supply Co*..	113.27
Company.....	48.00	Taylor P. Thompson.....	122.48

*Proposals for naval supplies for the Naval Station, New London, Conn., under Bureau advertisement, dated August 18, 1891; opened September 8, 1891.*

Class 1:		Class 3—Continued.	
Geo. M. Williams.....	\$75.76	Ansel W. Paine.....	\$379.36
Walter P. Denison.....	102.16	Class 4:	
Nathan S. Gallup*.....	73.28	Geo. M. Williams*.....	37.25
Hans Hemken.....	284.60	Nathan S. Gallup.....	40.78
Class 2:		Ansel W. Paine.....	38.00
Geo. M. Williams.....	252.95	Class 5:	
Chas. H. Pleasants.....	263.39	Geo. M. Williams*.....	60.00
Walter R. Denison.....	278.80	Nathan S. Gallup.....	160.00
James H. Taylor*.....	241.23	Thompson C. Gill & Co..	90.00
Nathan S. Gallup.....	268.04	Ansel W. Paine.....	120.00
Hans Hemken.....	460.75	Class 6:	
Chas. M. Childs & Co....	242.39	Leonard Mallory.....	621.00
Ansel W. Paine.....	304.75	Geo. M. Williams*.....	416.79
Class 3:		Nathan S. Gallup.....	506.56
Geo. M. Williams.....	222.27	Ansel W. Paine.....	569.90
Nathan S. Gallup†.....	221.09		

*Proposals for washtubs, terra cotta, etc., League Island navy-yard, under Bureau advertisement, dated August 27, 1891; opened September 8, 1891.*

Class 5:		Class 7—Continued.	
Chas. H. Pleasants*.....	\$132.16	James E. Magee.....	\$232.85
Hans Hemken.....	250.00	Hans Hemken.....	387.00
Class 6:		Manhattan Supply Co..	198.10
W. H. Hoskins*.....	184.79	Class 8:	
James E. Magee.....	205.07	W. H. Hoskins*.....	172.65
Hans Hemken.....	296.20	James E. Magee.....	189.00
Manhattan Supply Co*..	193.59	Hans Hemken.....	216.00
Class 7:		Manhattan Supply Co..	380.85
W. H. Hoskins.....	200.00		

*Proposals for building material, etc., for the Norfolk navy-yard, under Bureau advertisement dated August 20, 1891; opened September 8, 1891.*

Class 1:		Class 3:	
Richmond Granite Co....	\$344.00	I. Heylin MacDonald*...	\$812.80
Calvin Tompkins*.....	342.40	A. C. Babson.....	832.00
Niemeyer & Co.....	398.40	Hans Hemken.....	912.00
John O. Gamage.....	436.80	Niemeyer & Co.....	856.00
Geo. L. Neville.....	423.20	John O. Gamage.....	857.60
Class 2:		Geo. L. Neville.....	846.08
E. L. Lash.....	99.00	Class 4:	
Niemeyer & Co.....	112.50	Murdaugh & Mays.....	705.00
John O. Gamage.....	144.00	Hans Hemken.....	559.80
Ira B. White*.....	96.00	Niemeyer & Co*.....	537.00
Geo. L. Neville.....	134.97	John O. Gamage.....	646.80
		Geo. L. Neville.....	846.08

\* Accepted.

† Informal; does not bid on all items.

*Proposals for building material, etc for the Norfolk navy-yard, etc.—Continued.*

<b>Class 5:</b>		<b>Class 11:</b>	
Hans Hemken .....	\$45.00	Ira B. White .....	\$58.20
Chas. H. Pleasants .....	34.00	Geo. L. Neville * .....	47.40
Thompson C. Gill & Co. ....	37.50	<b>Class 12:</b>	
Ira B. White * .....	32.85	Standard Steel Co. ....	.21½
Geo. L. Neville .....	33.00	Norristown Steel Co. ....	.18½
<b>Class 6:</b>		Geo. L. Neville .....	.30
J. C. Emerson * .....	2,011.41	<b>Class 14:</b>	
Jesse I. Eppinger .....	2,998.55	J. B. Morrell & Co * .....	2,159.02
Geo. L. Neville .....	2,026.84	Ira B. White .....	2,175.90
<b>Class 7:</b>		Geo. L. Neville .....	2,161.90
Ira B. White .....	39.60	<b>Class 15:</b>	
Geo. L. Neville * .....	34.20	Manhattan Supply Co ...	43.06
<b>Class 8:</b>		J. B. Morrell & Co .....	34.00
Ira B. White .....	\$185.30	Chas. H. Pleasants .....	39.73
Geo. L. Neville * .....	169.63	Ira B. White .....	36.82
<b>Class 9:</b>		Geo. L. Neville * .....	33.20
J. C. Emerson .....	135.00	<b>Class 16:</b>	
W. L. Cooke * .....	60.00	Manhattan Supply Co ...	87.40
Geo. L. Neville .....	97.50	Ira B. White .....	164.00
<b>Class 10:</b>		Geo. L. Neville * .....	84.80
Chas. M. Childs & Co ...	63.80	<b>Class 17:</b>	
Fred'k B. Fiske * .....	57.50	Ira B. White .....	69.85
Chas. H. Pleasants .....	64.80	Geo. L. Neville * .....	59.26
Ira B. White .....	65.25	<b>Class 18:</b>	
Geo. L. Neville .....	63.25	Chas. H. Pleasants * .....	26.20

*Proposals for naval supplies for the navy-yard, Pensacola, Fla., under Bureau advertisement dated August 21, 1891; opened September 8, 1891.*

<b>Class 1:</b>		<b>Class 6:</b>	
T. J. McKenzie Oerting * ..	\$92.49	T. J. McKenzie Oerting ..	\$137.49
Jeremiah O. Neal .....	137.30	Jeremiah O. Neal * .....	136.48
<b>Class 2:</b>		<b>Class 7:</b>	
Jeremiah O. Neal * .....	70.60	Jeremiah O. Neal * .....	303.50
<b>Class 3:</b>		<b>Class 8:</b>	
T. J. McKenzie Oerting * ..	57.95	T. J. McKenzie Oerting ..	268.95
Jeremiah O. Neal .....	88.65	Jas. H. Taylor .....	246.90
<b>Class 4:</b>		Chas. M. Childs & Co. * ..	224.44
T. J. McKenzie Oerting * ..	129.94	Chas. H. Pleasants .....	252.38
Jeremiah O. Neal .....	153.30	Jeremiah O. Neal .....	402.25
<b>Class 5:</b>		<b>Class 9:</b>	
T. J. McKenzie Oerting * ..	270.67	T. J. McKenzie Oerting ..	42.60
S. C. Forsaith Machine Co. ..	360.00	Chas. H. Pleasants .....	41.25
Jeremiah O. Neal .....	343.50	Jeremiah O. Neal * .....	37.50

*Proposals for provisions for the New York navy-yard, under Bureau advertisement dated September 4, 1891; opened September 19, 1891.*

<b>Class 1, 1,200 pounds corn meal:</b>		<b>Class 3—Continued.</b>	
Manhattan Supply Co ...	\$0.05 <sup>41</sup> / <sub>100</sub>	Charles E. Ahrens .....	\$0.03 <sup>10</sup> / <sub>100</sub>
Thurber Whyland Co. ....	.05 <sup>85</sup> / <sub>100</sub>	Francis H. Leggett & Co ..	.03 <sup>10</sup> / <sub>100</sub>
Kemp, Day & Co. ....	.05 <sup>35</sup> / <sub>100</sub>	<b>Class 4, 4,000 pounds wheat</b>	
Charles E. Ahrens .....	.03 <sup>70</sup> / <sub>100</sub>	flour, 3,000 in barrels,	
Francis H. Leggett & Co * ..	.03 <sup>67</sup> / <sub>100</sub>	1,000 in half barrels:	
<b>Class 2, 5,500 pounds oatmeal:</b>		Manhattan Supply Co ...	1,098.00
Manhattan Supply Co ...	.09 <sup>65</sup> / <sub>100</sub>	Charles I. Goodwin & Son ..	1,080.00
Thomas W. Ormiston * ..	.03 <sup>87</sup> / <sub>100</sub>	Thurber Whyland Co. ....	1,103.00
Thurber Whyland Co. ....	.09 <sup>78</sup> / <sub>100</sub>	Charles E. Ahrens * .....	1,052.00
Kemp, Day & Co. ....	.05	Rowland & Co .....	1,090.00
Charles E. Ahrens .....	.03 <sup>80</sup> / <sub>100</sub>	Francis H. Leggett & Co ..	1,106.00
Francis H. Leggett & Co ..	.04 <sup>80</sup> / <sub>100</sub>	<b>Class 5, 65,000 pounds salt</b>	
<b>Class 3, 1,000 pounds hominy:</b>		pork, 49,000 in barrels,	
Manhattan Supply Co ...	.07 <sup>91</sup> / <sub>100</sub>	16,000 in half barrels:	
Thomas W. Ormiston * ..	.03 <sup>83</sup> / <sub>100</sub>	Charles F. Matilage * .....	5,001.10
Thurber Whyland Co. ....	.07 <sup>85</sup> / <sub>100</sub>	<b>Class 6, 7,500 gallons beans:</b>	
Kemp, Day & Co. ....	.04 <sup>70</sup> / <sub>100</sub>	Manhattan Supply Co ...	.29 <sup>45</sup> / <sub>100</sub>
		Thomas W. Ormiston ....	.28 <sup>45</sup> / <sub>100</sub>

\* Accepted.

*Proposals for provisions for the New York navy-yard, etc.—Continued.*

## Class 6—Continued.

Thurber Whyland Co....	\$0.29 <sup>00</sup> / <sub>100</sub>
Charles E. Ahrens*.....	.25 <sup>00</sup> / <sub>100</sub>
Charles F. Mattlage.....	.32 <sup>1</sup> / <sub>2</sub>
Francis H. Leggett & Co	.33

## Class 7, 1,500 pounds split pease:

Manhattan Supply Co*..	.02 <sup>81</sup> / <sub>100</sub>
Thomas W. Ormiston....	.02 <sup>80</sup> / <sub>100</sub>
Thurber Whyland Co....	.02 <sup>80</sup> / <sub>100</sub>
Kemp, Day & Co.....	.03
Charles E. Ahrens.....	.03 <sup>12</sup> / <sub>100</sub>
Francis H. Leggett & Co	.03

## Class 8, 25,000 pounds salt beef, 19,000 in barrels, 6,000 in half barrels:

Fairbank Canning Co...	1,500.25
Charles F. Mattlage.....	1,547.50
Francis H. Leggett & Co*	1,452.50

## Class 9, 12,000 pounds rice:

Manhattan Supply Co...	.06 <sup>18</sup> / <sub>100</sub>
Thomas W. Ormiston*...	.05 <sup>30</sup> / <sub>100</sub>
Thurber-Why- } barrels .	.06 <sup>10</sup> / <sub>100</sub>
land Co .... } half bbls	.06 <sup>10</sup> / <sub>100</sub>
Chas. E. Ahrens .....	.05 <sup>70</sup> / <sub>100</sub>
Gustave H. John .....	.05 <sup>70</sup> / <sub>100</sub>
Francis H. Leggett & Co.	.06 <sup>8</sup> / <sub>100</sub>

## Class 10, 6,000 pounds apples:

Manhattan Supply Co...	.10 <sup>75</sup> / <sub>100</sub>
Thomas W. Ormiston*...	.09 <sup>10</sup> / <sub>100</sub>
Thurber-Whyland Co...	.10 <sup>70</sup> / <sub>100</sub>
Kemp, Day & Co.....	.13 <sup>4</sup> / <sub>100</sub>
Chas. E. Ahrens .....	.12 <sup>30</sup> / <sub>100</sub>
Edwin L. Allen.....	.10 <sup>80</sup> / <sub>100</sub>

## Class 11, 6,000 pounds peaches:

Manhattan Supply Co...	.12 <sup>75</sup> / <sub>100</sub>
Thomas W. Ormiston*...	.09 <sup>40</sup> / <sub>100</sub>
Thurber-Whyland Co...	.12 <sup>80</sup> / <sub>100</sub>
Kemp, Day & Co.....	.16
Chas. E. Ahrens .....	.10 <sup>50</sup> / <sub>100</sub>
Edwin L. Allen .....	.13 <sup>80</sup> / <sub>100</sub>

## Class 11, 50,000 pounds tomatoes:

Kemp, Day & Co.*.....	.03 <sup>40</sup> / <sub>100</sub>
Chas. E. Ahrens .....	.03 <sup>80</sup> / <sub>100</sub>
Francis H. Leggett & Co.	.03 <sup>100</sup> / <sub>100</sub>

## Class 13, 20,000 pounds roast beef:

Fairbank Canning Co.*.	.06 <sup>1</sup> / <sub>100</sub>
Thurber-Whyland Co....	.06 <sup>70</sup> / <sub>100</sub>
Chas. E. Ahrens .....	.06 <sup>70</sup> / <sub>100</sub>
Chas. F. Mattlage.....	.06 <sup>9</sup> / <sub>100</sub>
Armour & Co .....	.07
Francis H. Leggett & Co.	.06 <sup>30</sup> / <sub>100</sub>

## Class 14, 20,000 pounds roast mutton:

Francis H. Leggett & Co.*	.12
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## Class 15, 25,000 pounds corned beef:

Fairbank Can- } 2 pound.	.0795
ning Co .... } 4 pounds	.0738

## Class 15—Continued.

Thurber-Whyland Co. ...	\$0.07 <sup>45</sup> / <sub>100</sub>
Chas. E. Ahrens .....	.07 <sup>45</sup> / <sub>100</sub>
Chas. F. Mattlage* .....	.06 <sup>10</sup> / <sub>100</sub>
Armour & Co .....	.08 <sup>1</sup> / <sub>100</sub>
Francis H. Leggett & Co	.07 <sup>70</sup> / <sub>100</sub>

## Class 16, 1,500 pounds brawn:

Fairbank Can- } 2 pounds	.0795
ning Co .... } 4 pounds	.0738
Thurber-Whyland Co ...	.0863
Charles E. Ahrens .....	.0835
Chas. F. Mattlage .....	.0977
Armour & Co.* .....	.07
Francis H. Leggett & Co.	.09 <sup>1</sup> / <sub>100</sub>

## Class 17, 30,000 pounds ham:

Thurber-Whyland Co.*...1,	284.00
Chas. E. Ahrens .....	1,287.00
Francis H. Leggett & Co.	.13 <sup>8</sup> / <sub>100</sub>

## Class 18, 6,000 pounds bacon:

Chas. F. Mattlage* .....	1,227.00
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## Class 19, 2,500 pounds sausage:

Kemp, May & Co.* .....	.12 <sup>1</sup> / <sub>100</sub>
Armour & Co .....	.12 <sup>1</sup> / <sub>100</sub>
Francis H. Leggett & Co.	.12 <sup>1</sup> / <sub>100</sub>

## Class 20, 6,000 pounds fish:

Kemp, May & Co.....	.10 <sup>1</sup> / <sub>100</sub>
Chas. E. Ahrens* .....	.0994

## Class 21, 4,000 pounds tea:

Arthur S. Palmer .....	.40
Robt. G. Thomas .....	.25 <sup>35</sup> / <sub>100</sub>
Manhattan Supply Co ...	.23 <sup>70</sup> / <sub>100</sub>
Thos. W. Ormiston .....	.26 <sup>85</sup> / <sub>100</sub>
Thurber-Whyland Co ...	.23 <sup>30</sup> / <sub>100</sub>
Chas. E. Ahrens* .....	.23 <sup>30</sup> / <sub>100</sub>
Francis H. Leggett & Co.	.25 <sup>70</sup> / <sub>100</sub>

## Class 22, 55,000 pounds sugar (41,000 in barrels, 14,000 in half barrels):

Manhattan Supply Co...2,	486.50
Thos. W. Ormiston .....	2,516.70
Thurber-Whyland Co ...2,	437.20
Chas. E. Ahrens .....	2,483.40
Gustave A. John .....	2,561.25
Francis H. Leggett & Co.*2,	436.35

## Class 23, 25,000 pounds pickles:

Kemp, Day & Co.....	.06 <sup>70</sup> / <sub>100</sub>
F. Fochrenbach & Co.*..	.06

## Class 24, 1,500 gallons syrup:

Manhattan Supply Co ...	.30 <sup>85</sup> / <sub>100</sub>
Thomas W. Ormiston....	.25 <sup>10</sup> / <sub>100</sub>
Thurber-Whyland Co ...	.30 <sup>80</sup> / <sub>100</sub>
Chas. E. Ahrens* .....	.21 <sup>80</sup> / <sub>100</sub>
Gustave H. John .....	.27
Francis H. Leggett & Co.	.24

## Class 25, 1,500 gallons vinegar:

Thos. W. Ormiston*.....	.13 <sup>21</sup> / <sub>100</sub>
Chas. E. Ahrens .....	.14
F. Fochrenbach & Co ...	.14

\*Accepted.

*Proposals for naval supplies for the navy-yard, Mare Island, California, under Bureau advertisement dated August 26, 1891; opened September 22, 1891.*

Class 1, 20 tons coke:		Class 18, lumber:	
A. S. Carman* .....	\$269.00	A. S. Carman .....	\$3,932.09
Class 2, electrical supplies:		F. W. Keeling & Sons* ..	3,921.78
California Electrical		Wm. Walker .....	5,106.12
Works .....	706.12	Class 19, bolts, Tobin bronze,	
Miller, Sloss & Scott* ..	679.26	etc.:	
Class 3, miscellaneous:		Miller, Sloss & Scott....	438.40
Chas. H. Pleasants* .....	267.83	Dunham, Carrigan & Hay-	
Miller, Sloss & Scott .....	288.10	den Co. * .....	436.00
Class 4, hardware, tools, etc.:		Class 20, alcohol:	
Albert Gallatin* .....	1,060.43	F. N. Woods* .....	230.80
Miller, Sloss & Scott .....	1,204.04	Charles H. Pleasants .....	271.40
Dunham, Carrigan &		Class 21, brooms:	
Hayden Co. ....	1,108.90	Louis E. Lake* .....	356.27
Carolan & Co .....	1,493.29	Class 22, rope, etc.:	
Class 5, drawing instruments:		Albert Gallatin* .....	80.75
Chas. H. Pleasant .....	71.27	Charles H. Pleasants .....	88.17
Miller, Sloss & Scott .....	116.80	Miller, Sloss & Scott .....	85.79
Manhattan Supply Co.* ..	58.70	Manhattan Supply Co .....	90.79
Class 6, hose:		Class 23, rubber, etc.:	
J. W. Girvin & Co.* .....	1,199.32	J. W. Girvin & Co.* .....	79.00
John Arnett .....	1,432.10	John Arnett .....	233.50
W. F. Bowers .....	1,285.75	Miller, Sloss & Scott .....	180.00
Class 7, hand grenades:		W. F. Bowers .....	328.00
Miller, Sloss & Scott .....	291.90	Manhattan Supply Co .....	103.00
Manhattan Supply Co.* ..	153.75	Class 24, canvas:	
Class 8, brick:		J. B. Morrell & Co.* .....	268.00
Aden Brothers* .....	200.00	Class 25, skins:	
A. S. Carman .....	220.00	J. B. Morrell & Co. ....	390.75
Wm. Walker .....	240.00	Charles H. Pleasants* .....	205.32
Class 9, cement:		Louis E. Lake .....	733.50
Aden Brothers .....	591.00	Class 26, paints:	
A. S. Carman* .....	515.00	F. N. Woods .....	1,935.20
Wm. Walker .....	598.50	Charles M. Yates* .....	1,878.13
Class 10, glass:		Charles H. Pleasants .....	2,412.90
F. N. Woods* .....	172.59	Chas. M. Childs & Co .....	2,301.95
Class 11, hardware:		Class 27, hair, etc.:	
Albert Gallatin .....	2,010.98	Manhattan Supply Co.* ..	73.30
Miller, Sloss & Scott .....	2,031.04	Class 28, belting:	
Dunham, Carrigan & Hay-		Horatio N. Cook .....	709.00
den Co. * .....	1,957.21	J. W. Girvin & Co .....	981.00
Carolan & Co .....	2,244.84	Loeb Bros. ....	685.10
Class 12, lumber:		John Arnett .....	984.00
A. S. Carman .....	7,212.70	Albert Gallatin .....	886.00
F. W. Keeling & Son* .....	6,222.45	Miller, Sloss & Scott .....	889.50
Wm. Walker .....	7,609.50	S. C. Forsaith Mch. Co .....	881.30
Class 13, oil:		W. F. Bowers .....	763.00
J. W. Knowles* .....	345.50	Dunham, Carrigan & Hay-	
Chas. M. Yates .....	463.75	den Co. ....	748.40
Chas. H. Pleasants .....	568.20	Grattan and Knight Man-	
H. B. Willis .....	407.50	ufacturing Co.* .....	620.00
Class 14, pipe, etc.:		Class 29, harness:	
O. J. Backus .....	889.68	Louis E. Lake* .....	201.21
Albert Gallatin* .....	851.66	Class 30, brazilete:	
Miller, Sloss & Scott .....	909.47	A. S. Carman* .....	825.00
Dunham, Carrigan, &		Class 32, packing:	
Hayden Co. ....	875.81	J. W. Girvin & Co.* .....	95.10
Class 15, metal:		Albert Gallatin .....	124.70
Miller, Sloss & Scott* .....	2,808.75	Miller, Sloss & Scott .....	164.55
Class 16, crane:		Dunham, Carrigan & Hay-	
Miller, Sloss & ( Bid A* ..	1,950.00	den Co. ....	128.05
Scott..... } Bid B ..	1,750.00	Manhattan Supply Co .....	119.45
Class 17, cement etc.:		Class 33, files:	
Aden Brothers .....	330.00	Hanley Bro. Hardware Co	305.00
A. S. Carman* .....	259.00	Jas. N. Soper* .....	304.19
Wm. Walker .....	297.50	Albert Gallatin .....	321.24

\* Accepted.

*Proposals for naval supplies for the navy-yard, Mare Island, California, etc.—Continued.*

<b>Class 33—Continued.</b>		<b>Class 36, canvas etc.:</b>	
Miller, Sloss & Scott.....	\$324.69	J. B. Morrell & Co.*.....	\$9,339.31
Dunham, Carrigan & Hayden Co.....	321.62	Manhattan Supply Co....	10,533.95
Carolan & Co.....	354.09	<b>Class 37, hose:</b>	
<b>Class 34, shades:</b>		J. W. Girvin & Co.*.....	742.32
Charles H. Pleasants.....	12,500.00	John Arnett.....	916.00
Miller, Sloss & Scott*....	250.00	W. F. Bowers.....	867.76
<b>Class 35, paints, etc.:</b>		<b>Class 39, leather:</b>	
F. N. Woods.....	570.67	Louis E. Lake*.....	395.50
Chas. M. Yates*.....	569.62	<b>Class 40, oil:</b>	
Chas. H. Pleasants.....	728.80	F. N. Woods.....	133.75
Chas. M. Childs & Co....	790.55	J. N. Knowles*.....	98.75
		Chas. M. Yates.....	115.75
		H. B. Willis.....	131.25

*Proposals for naval supplies for the Naval Academy, Annapolis, Md., under Bureau advertisement dated August 31, 1891; opened September 22, 1891.*

<b>Class 4, chemical instruments:</b>		<b>Class 8, lumber:</b>	
Chas. H. Pleasants*.....	\$65.65	Wm. D. Gill & Son.....	\$107.00
<b>Class 5, coal:</b>		John Kealy*.....	102.50
John Kealy*.....	100.00	<b>Class 9, alcohol:</b>	
<b>Class 6, hardware:</b>		Chas. H. Pleasants.....	26.20
Ira B. White*.....	136.91	<b>Class 10, paints:</b>	
<b>Class 7, glass, etc:</b>		Chas. H. Pleasants.....	188.90
Chas. H. Pleasants.....	17.98	Ira B. White.....	167.30
R. R. MacGruder & Co.*..	15.75	Chas. M. Childs & Co.*..	164.20
		R. R. MacGruder & Co..	176.10

*Proposals for naval supplies for the New York navy-yard, under Bureau advertisement dated August 25, 1891; opened September 29, 1891.*

<b>Class 1, blacking brushes:</b>		<b>Class 7—Continued.</b>	
Cavanaugh & Thompson..	\$549.50	Colwell Lead Co.....	\$575.00
Tissot & Schultz.....	543.50	S. C. Forsaith Machine Co..	553.00
Manhattan Supply Co....	560.00	Aquila Rich*.....	553.00
Joseph Wechsler*.....	525.00	J. B. Morrell & Co.....	620.00
Chas. H. Pleasants.....	612.50	Geo. H. Carey.....	580.00
<b>Class 2, thread:</b>		<b>Class 8, packing:</b>	
Tissot & Schultz*.....	289.00	Manhattan Supply Co.*..	335.10
Joseph Wechsler.....	293.75	Chas. H. Pleasants.....	358.21
Chas. H. Pleasants.....	306.00	<b>Class 9, paints:</b>	
<b>Class 3, ivory buttons:</b>		Wm. McDonagh & Co....	4,108.60
Tissot & Schultz.....	79.25	Chas. M. Childs & Co.*..	4,098.09
Joseph Wechsler*.....	77.50	Gould & Cutler Corpora-	
Chas. H. Pleasants.....	87.35	tion.....	4,328.55
<b>Class 4, girder:</b>		Aquila Rich.....	4,137.34
Manhattan Supply Co.*..	411.60	James H. Taylor.....	4,362.40
S. C. Forsaith Machine Co..	495.00	Chas. H. Pleasants.....	4,428.43
Eugene L. Maxwell.....	472.67	J. B. Morrell & Co.....	4,170.19
<b>Class 5, nuts and bolts:</b>		Geo. H. Carey.....	4,822.10
Thompson C. Gill.....	659.90	<b>Class 10, crews, hardware,</b>	
Manhattan Supply Co.*..	540.60	<b>etc.:</b>	
Eugene L. Maxwell.....	572.35	Harry L. Briggs*.....	3,778.97
<b>Class 6, Tobin bronze:</b>		Braunsdorf & Gerstner..	3,838.40
Ansonia Brass and Copper		Francis T. Witte Hard-	
Co.*.....	831.00	ware Co.....	4,250.14
Manhattan Supply Co....	882.60	Manhattan Supply Co....	3,997.61
Eugene L. Maxwell.....	903.57	George H. Carey.....	3,951.71
J. B. Morrell & Co.....	878.45	H. T. Wakeman.....	4,036.27
Geo. H. Carey.....	874.30	<b>Class 11, pipe, etc.:</b>	
<b>Class 7, zinc, etc.:</b>		Manhattan Supply Co....	6,493.18
Geo. L. Neville.....	580.00	Colwell Lead Co.....	5,156.88
E. J. Temple.....	725.00	S. C. Forsaith Machine Co..	5,911.07
Thompson C. Gill & Co....	620.00	Henry McShane Manufac-	
Manhattan Supply Co....	578.00	turing Co.*.....	5,108.85

\*Accepted.

†Decided by lot.

*Proposals for naval supplies for the New York navy-yard, etc.—Continued.*

<b>Class 12, bolts and nuts:</b>		<b>Class 24, oil, lubricating and burning:</b>	
Harry L. Briggs	\$1,024.97	T. J. Gilroy & Co	\$1,520.00
Manhattan Supply Co	1,128.43	Manhattan Supply Co	1,591.00
Eugene L. Maxwell	917.21	Stevenson Bro. & Co	2,166.50
J. B. Morrell & Co	1,069.68	Manhattan Oil Co.*	1,318.50
Geo. H. Carey	993.63	Fiske Bros	1,462.50
<b>Class 13, brushes:</b>		Chas. B. Marsh	2,062.50
Harry L. Briggs	726.75	<b>Class 25, files:</b>	
Tissot & Schultz	794.19	Harry L. Briggs	1,225.71
Manhattan Supply Co	728.87	Geo. L. Neville	1,097.85
J. B. Morrell & Co	917.60	Braundsdorf & Gerstner	1,260.61
Geo. H. Carey	736.91	E. J. Temple	1,213.23
<b>Class 14, cement, bricks, etc.:</b>		Tissot & Schultz	2,071.37
Harry L. Briggs	1,201.07	Francis T. Witte Hard-	
Manhattan Supply Co	1,406.75	ware Co. *	1,090.80
J. B. Morrell & Co	1,525.90	Manhattan Supply Co	1,198.94
Geo. H. Carey	1,419.00	James W. Soper	1,245.14
<b>Class 15, rope, etc.:</b>		Geo. H. Carey	1,272.69
George L. Neville	1,967.41	<b>Class 26, lanterns:</b>	
Tissot & Schultz*	1,851.29	Manhattan Supply Co.*	20.40
Manhattan Supply Co	1,883.95	Chas. H. Pleasants	35.98
S. C. Forsaith Machine Co.	1,975.55	<b>Class 27, naval stores:</b>	
J. B. Morrell & Co	1,873.66	Harry L. Briggs	1,078.02
<b>Class 16, belting, etc.:</b>		Manhattan Supply Co	1,184.28
Page Belting Co	1,843.34	Chas. H. Pleasants	1,306.46
Geo. L. Neville	2,118.45	J. B. Morrell & Co	1,209.29
Loeb Brothers	1,936.96	Geo. H. Carey	1,148.34
Heim Belting Co.*	1,632.45	<b>Class 28, hose:</b>	
Manhattan Supply Co	1,671.10	Page Belting Co	387.80
S. C. Forsaith Machine Co.	1,677.20	Manhattan Supply Co.*	333.55
Newark Leather Belting		Wm. A. Wheeler	617.73
Co	2,213.40	J. B. Morrell & Co	588.50
Henry McShane Manufac-		Geo. H. Carey	548.50
turing Co	1,718.24	<b>Class 29, stationery:</b>	
<b>Class 17, lumber:</b>		Manhattan Supply Co.*	211.90
Higgins Bros	10,039.04	<b>Class 30, chairs, etc.:</b>	
Chas. E. Pell	10,915.00	Joseph Wechsler *	60.00
Jos. W. Duryee	11,773.69	Geo. H. Carey	74.00
John McClave*	10,035.62	<b>Class 31, pulley blocks:</b>	
Watson & Pittinger	14,921.51	Harry L. Briggs	74.00
<b>Class 18, tools, etc.:</b>		Manhattan Supply Co	77.60
Harry L. Briggs	5,198.01	James W. Soper *	69.60
Tissot & Schultz *	5,122.73	S. C. Forsaith Machine Co.	90.00
Manhattan Supply Co	5,852.51	J. B. Morrell & Co	84.00
S. C. Forsaith Machine Co.	6,434.61	Geo. H. Carey	80.00
Eugene L. Maxwell	5,570.61	<b>Class 32, oil of vitrol:</b>	
<b>Class 19, drilling machine:</b>		Harry L. Briggs	60.30
Manhattan Supply Co	745.00	Tissot & Schultz	60.37
Eugene L. Maxwell *	726.80	Manhattan Supply Co	60.72
<b>Class 20, brass, etc.:</b>		Chas. M. Childs & Co	169.96
Manhattan Supply Co.*	2,374.38	S. C. Forsaith Machine Co.	118.44
Colwell Lead Co	2,689.19	Chas. H. Pleasants *	47.81
S. C. Forsaith Machine Co.	3,555.20	<b>Class 33, coke:</b>	
Geo. H. Carey	2,504.10	Sam'l G. French *	188.40
<b>Class 21, pig iron:</b>		Eugene L. Maxwell	299.40
Thompson C. Gill & Co	1,725.00	Geo. H. Carey	324.00
Manhattan Supply Co	1,763.00	<b>Class 34, muslin, etc.:</b>	
S. C. Forsaith Machine		Harry L. Briggs *	139.97
Co. *	1,696.40	Geo. L. Neville	268.70
Eugene L. Maxwell	1,775.50	Tissot & Schultz	163.74
<b>Class 22, packing:</b>		Manhattan Supply Co	162.04
Manhattan Supply Co	1,676.35	Geo. H. Carey	186.68
Geo. H. Carey *	1,572.17	<b>Class 35, rubber:</b>	
H. T. Wakeman	1,862.21	Harry L. Briggs	92.26
<b>Class 23, alcohol:</b>		Page Belting Co	80.50
Chas. H. Pleasants *	694.30		

\* Accepted.



*Proposals for naval supplies for the New York navy-yard, etc.—Continued.*

Class 35—Continued.		Class 43 A, steel:	
Tissot & Schultz .....	\$113.00	Midvale Steel Co. ....	\$129.35
Manhattan Supply Co.* ..	78.24	Park Bro. & Co., L't'd ..	143.88
Wm. A. Wheeler .....	87.75	E. J. Temple* .....	74.47
J. B. Morrell & Co. ....	85.00	Manhattan Supply Co. ....	85.17
Geo. H. Carey .....	82.00	Benj. Atha & Illingworth	
Class 36, 30 tons coal:		Co. ....	87.38
Samuel G. French * .....	154.20	S. C. Forsaith Machine Co	158.13
Class 37—glass:		Class 43 B, steel:	
Manhattan Supply Co. ....	73.40	Midvale Steel Co.† .....	405.00
Charles H. Pleasants .....	72.20	Park Bro. & Co., Limited†	590.50
Eugene L. Maxwell .....	60.76	E. J. Temple .....	500.00
J. B. Morrell & Co. ....	62.90	Manhattan Supply Co.* ..	456.75
Geo. H. Carey * .....	59.58	Class 43 C, steel:	
Class 38, glass tubes:		E. J. Temple .....	203.93
Harry L. Briggs .....	6.35	Manhattan Supply Co.* ..	196.40
Manhattan Supply Co.* ..	4.93	Class 43 D, steel:	
Stevenson Bro. & Co. ....	31.50	Midvale Steel Co. ....	2,341.30
S. C. Forsaith Machine Co.	11.25	Park Bro. & Co., Limited†	2,709.00
Chas. H. Pleasants .....	9.45	E. J. Temple .....	2,068.44
Henry McShane Manufac-		Manhattan Supply Co. ....	1,688.45
turing Co. ....	6.62	Benj. Atha & Illingworth	
Eugene L. Maxwell .....	6.30	Co.* .....	1,606.50
J. B. Morrell & Co. ....	7.30	Geo. H. Carey .....	1,763.80
Geo. H. Carey .....	6.40	Class 44, iron:	
Class 39, oars:		Geo. L. Neville .....	3,270.75
Geo. L. Neville .....	297.44	Thompson C. Gill & Co. ....	3,655.56
Tissot & Schultz .....	290.86	Manhattan Supply Co. ....	2,288.20
Manhattan Supply Co. ....	284.16	Eugene L. Maxwell .....	2,238.59
James W. Soper .....	263.40	Geo. H. Carey* .....	2,214.94
Aquila Rich* .....	256.88	Class 45, oil, miscellaneous:	
Chas. H. Pleasants .....	258.24	Wm. F. Ford .....	438.84
J. B. Morrell & Co. ....	277.29	T. J. Gilroy & Co. ....	456.75
Geo. H. Carey .....	275.35	Manhattan Supply Co. ....	440.75
Class 40, electrical supplies:		Stevenson Bro. & Co. ....	583.50
Tissot & Schultz .....	1,113.39	Manhattan Oil Co.* .....	436.50
Manhattan Supply Co. ....	1,330.50	Fiske Bros .....	451.50
Eugene L. Maxwell* .....	1,037.00	Chas. B. Marsh .....	485.00
Class 41, Chapman valves:		Class 46, oil cylinder:	
Manhattan Supply Co. ....	240.68	Wm. F. Ford .....	89.60
S. C. Forsaith Machine Co	286.06	T. J. Gilroy & Co. ....	106.40
Henry McShane Manufac-		Manhattan Supply Co.* ..	72.80
turing Co.* .....	236.72	Stevenson Bro. & Co. ....	179.20
Eugene L. Maxwell .....	263.26	Fiske Bros .....	140.00
Class 42, armature for dynamo:		Chas. B. Marsh .....	182.00
Tissot & Schultz* .....	483.00		
Manhattan Supply Co. ....	523.00		

*Proposals for naval supplies for the navy-yard, Washington, D. C., under Bureau advertisement dated August 27, 1891; opened September 29, 1891.*

Class 1, flange iron:		Class 4—Continued.	
Geo. L. Neville .....	\$187.50	James C. Burton .....	\$277.10
Thompson C. Gill & Co.* ..	140.00	Donegan & Swift .....	247.54
Class 3, paints:		Thompson C. Gill & Co. ....	255.30
Ira B. White .....	1,784.00	J. H. Chesley & Co.* .....	233.11
Chas. H. Pleasants .....	1,999.30	Class 5, lumber:	
Francis Miller .....	1,808.00	Joseph W. Duryee* .....	90.00
Hanline Brothers .....	1,813.50	Wheatly Bros .....	107.50
Geo. Ryneal, jr.* .....	1,754.25	J. W. Gaskill & Sons .....	110.00
Geo. L. Neville .....	2,100.00	Class 6, pipe, etc.:	
Chas. M. Childs & Co. ....	1,790.00	S. C. Forsaith Machine Co	407.39
James H. Taylor .....	1,888.00	Wm. C. Codd .....	423.78
Class 4, roofing tin, etc.:		Manhattan Supply Co. ....	400.45
S. C. Forsaith Machine Co	292.59	Donegan & Swift .....	318.89
Geo. L. Neville .....	409.81	Robt. Leatch & Sons* .....	307.95
Manhattan Supply Co. ....	316.85		

\* Accepted.

† Informal.

*Proposals for naval supplies for the navy-yard, Washington, D. C., etc.—Continued.*

<b>Class 7, brushes:</b>		<b>Class 18, leather:</b>	
Geo. Ryneal, jr. * .....	\$164.84	S. C. Forsaith Machine Co. ....	\$38.40
<b>Class 8, spikes:</b>		Page Belting Co.* .....	22.40
James B. Lambie* .....	275.55	William C. Codd .....	28.00
J. H. Chesley & Co .....	323.39	George L. Neville .....	42.00
<b>Class 9, drawing material:</b>		Stevenson Bro. & Co .....	32.20
Fred. A. Schmidt .....	688.65	James B. Lambie .....	28.00
Geo. Ryneal, jr.* .....	642.43	<b>Class 19, tube-expander:</b>	
Manhattan Supply Co .....	699.55	S. C. Forsaith Machine Co. ....	86.50
<b>Class 10, lumber:</b>		William C. Codd .....	101.00
Joseph W. Duryee .....	1,260.50	Manhattan Supply Co .....	75.40
Wheatly Brothers .....	1,391.50	Donegan & Swift* .....	59.00
Geo. L. Neville .....	1,850.00	<b>Class 20, screws, etc.:</b>	
J. W. Gaskill & Sons* .....	1,235.50	James B. Lambie* .....	303.21
Chas. E. Pell .....	1,417.00	<b>Class 21, belting:</b>	
<b>Class 11, tools:</b>		S. C. Forsaith Machine Co. ....	41.27
James B. Lambie* .....	148.72	Page Belting Co.* .....	24.45
<b>Class 12, paints:</b>		William C. Codd .....	39.50
Ira B. White .....	711.10	James B. Lambie .....	31.55
Charles H. Pleasants .....	756.96	<b>Class 22, chemicals:</b>	
Francis Miller .....	653.28	Manhattan Supply Co.* .....	509.27
Hanline Brothers .....	621.78	<b>Class 23, iron pipe:</b>	
George Ryneal, jr .....	614.97	William C. Codd* .....	274.39
Charles M. Childs & Co.* .....	593.73	S. C. Forsaith Machine Co. ....	343.06
James H. Taylor .....	632.45	Manhattan Supply Co .....	310.33
<b>Class 13, alcohol:</b>		Robert Leatch & Sonst..	168.04
Charles H. Pleasants* .....	204.00	<b>Class 24, lumber:</b>	
<b>Class 14, glass:</b>		Wheatly Brothers .....	472.50
Francis Miller .....	17.00	J. W. Gaskill & Sons* .....	403.00
Hanline Brothers .....	15.10	<b>Class 25, paints:</b>	
George Ryneal, jr.* .....	14.90	Chas. H. Pleasants .....	112.47
George L. Neville .....	32.00	Francis Miller .....	105.70
<b>Class 15, lime:</b>		Hanline Bros .....	99.37
George L. Neville* .....	385.00	Geo. Ryneal, jr.* .....	99.58
<b>Class 16, packing:</b>		Chas. M. Childs & Co .....	102.05
S. C. Forsaith Machine Co. ....	60.20	<b>Class 26, alcohol:</b>	
Page Belting Co. ....	51.12	Chas. H. Pleasants* .....	54.40
William C. Codd .....	68.20	<b>Class 27, fire extinguishers:</b>	
Manhattan Supply Co.* .....	50.33	Manhattan Supply Co.* .....	196.80
James B. Lambie .....	67.75	<b>Class 29, stationery:</b>	
<b>Class 17, valves, etc.:</b>		Easton & Rupp .....	506.70
S. C. Forsaith Machine Co. ....	578.78	Manhattan Supply Co.* .....	494.73
William C. Codd .....	492.63	<b>Class 30, stationery:</b>	
Manhattan Supply Co .....	538.55	Easton & Rupp* .....	414.30
Donegan & Swift .....	488.39	Manhattan Supply Co .....	474.10
Robert Leatch & Sonst..	474.00	<b>Class 31, stationery:</b>	
		Easton & Rupp .....	38.50
		Manhattan Supply Co .....	51.10

*Proposals for naval supplies for the Norfolk navy-yard, under Bureau advertisement dated September 10, 1891; opened September 29, 1891.*

<b>Class 1, steel castings:</b>		<b>Class 4, steel rails:</b>	
Geo. L. Neville .....	\$0.40	S. C. Forsaith Machine Co. ....	\$915.48
Standard Steel Casting Co .....	.21	Geo. L. Neville .....	1,243.22
Norristown Steel Co* .....	1.18½	Thompson C. Gill & Co.* .....	1,056.17
Midvale Steel Co .....	.23	<b>Class 5, hydraulic jack:</b>	
<b>Class 2, steel castings:</b>		S. C. Forsaith Machine Co. ....	130.00
Geo. L. Neville .....	.30	Geo. L. Neville .....	175.00
Standard Steel Casting Co* .....	.14	Manhattan Supply Co .....	157.50
Norristown Steel Co .....	.75	Chas. H. Pleasants .....	150.00
<b>Class 3, lumber:</b>		Thompson C. Gill & Co..	135.00
W. C. Cooke* .....	1,641.16	Donegan & Swift .....	108.00
Geo. L. Neville .....	2,546.64	White & Dodson* .....	91.50
Jno. C. Emerson .....	2,829.60		

\*Accepted.

†Informal.

*Proposals for naval supplies for the Norfolk navy-yard, etc.—Continued.*

<b>Class 6, pipe:</b>		<b>Class 17, grates:</b>	
S. C. Forsaith Machine Co.	\$1, 214. 00	Geo. L. Neville	\$90. 50
Colwell Lead Co.	1, 042. 24	J. C. James	43. 25
Geo. L. Neville	1, 156. 50	J. H. Chesley & Co.*	32. 30
Wm. C. Codd	1, 282. 00	White & Dodson	65. 75
Manhattan Supply Co.	1, 147. 75	<b>Class 18, bolts and nuts:</b>	
Donegan & Swift*	954. 81	Geo. L. Neville	328. 37
White & Dodson	1, 161. 75	J. H. Sternbergh & Son*	266. 97
James Robertson & Co.	1, 127. 65	<b>Class 19, bricks:</b>	
<b>Class 7, steel rivets:</b>		Geo. L. Neville	270. 00
S. C. Forsaith Machine Co.	652. 50	Niemeyer & Co.	146. 80
Geo. L. Neville	630. 00	Manhattan Supply Co.	174. 00
J. H. Sternbergh & Son*†	630. 00	Thompson C. Gill & Co.	170. 00
White & Dodson	720. 00	White & Dodson	300. 00
<b>Class 8, pipe, etc.:</b>		<b>Class 20, belting:</b>	
S. C. Forsaith Machine Co.	594. 76	S. C. Forsaith Machine Co.	85. 00
Colwell Lead Co.*	507. 63	Geo. L. Neville	82. 00
Geo. L. Neville	682. 60	Page Belting Co.	75. 30
Wm. C. Codd	598. 46	Loeb Bros.	76. 00
Manhattan Supply Co.	532. 21	Wm. C. Codd	92. 50
Donegan & Swift	523. 40	Manhattan Supply Co.*	67. 00
White & Dodson	549. 95	Chas. H. Pleasants	102. 75
<b>Class 9, valves, etc.:</b>		Stevenson Bro. & Co.	142. 75
Geo. L. Neville	503. 00	Donegan & Swift	90. 25
Page Belting Co.*	327. 70	White & Dodson	113. 50
Manhattan Supply Co.	481. 50	<b>Class 21, steel:</b>	
White & Dodson	400. 80	S. C. Forsaith Machine Co.*	662. 85
<b>Class 10, bricks:</b>		Geo. L. Neville	916. 36
Geo. L. Neville *	13. 00	Thompson C. Gill & Co.	681. 77
Niemeyer & Co.	19. 25	Park Bro. & Co., limited	686. 84
White & Dodson	17. 00	<b>Class 22, iron:</b>	
<b>Class 11, brushes, etc.:</b>		S. C. Forsaith Machine Co.	148. 72
Geo. L. Neville	197. 13	Geo. L. Neville	156. 96
J. H. Chesley & Co.	194. 47	Thompson C. Gill & Co.*	141. 67
White & Dodson*	193. 97	<b>Class 23, packing, etc.:</b>	
<b>Class 12, glass:</b>		S. C. Forsaith Machine	
Geo. L. Neville	82. 95	Co.*	83. 57
Chas. H. Pleasants*	68. 94	Geo. L. Neville	222. 57
White & Dodson	89. 85	Manhattan Supply Co.	153. 45
<b>Class 13, lumber:</b>		White & Dodson	143. 17
Geo. L. Neville *	1, 678. 00	<b>Class 24, alcohol:</b>	
John C. Emerson	1, 938. 50	Chas. H. Pleasants*	39. 30
<b>Class 14, metals:</b>		<b>Class 25, files:</b>	
S. C. Forsaith Machine Co.	295. 72	Geo. L. Neville	737. 80
Colwell Lead Co.*	284. 12	White & Dodson *	378. 27
Geo. L. Neville	314. 23	<b>Class 26, waste:</b>	
Manhattan Supply Co.	306. 85	Geo. L. Neville	123. 75
J. C. James	331. 12	Manhattan Supply Co.	124. 50
Thompson C. Gill & Co.	329. 11	Chas. H. Pleasants *	101. 62
J. H. Chesley & Co.	321. 80	White & Dodson	126. 25
White & Dodson	318. 34	<b>Class 27:</b>	
<b>Class 15, paints:</b>		S. C. Forsaith Machine	
Geo. L. Neville	664. 80	Co.*	214. 76
Chas. M. Childs & Co.	599. 62	Geo. L. Neville	234. 00
James H. Taylor	491. 10	Manhattan Supply Co.	219. 75
Gould & Cutler Corpora- tion *	458. 66	White & Dodson	219. 50
Chas. H. Pleasants	616. 84	<b>Class 28, hose:</b>	
White & Dodson	540. 85	Geo. L. Neville	90. 00
<b>Class 16, pipe, etc.:</b>		Manhattan Supply Co.	21. 00
S. C. Forsaith Machine Co.	511. 24	White & Dodson	60. 00
Colwell Lead Co.*	3, 070. 02	<b>Class 29, oil:</b>	
Geo. L. Neville	486. 37	Geo. L. Neville	1, 249. 75
Wm. C. Codd	417. 43	Fiske Bros.*	714. 50
Manhattan Supply Co.	433. 79	Manhattan Supply Co.	968. 25
Donegan & Swift	389. 44	White & Dodson	925. 75
White & Dodson	430. 50	<b>Class 30, stationery:</b>	
James Robertson & Co.	577. 60	Geo. L. Neville *	22. 25
		White and Dodson	40. 50

\* Accepted.

† Decided by lot.

*Proposals for steel wire for the navy-yard at Mare Island, Cal., under Bureau advertisement, dated September 9, 1891; opened September 29, 1891.*

**Class A, steel wire:**

S. C. Forsaith Machine Co.	\$1,880.00
Weston Electric Co.....	2,100.00

**Class A.—Continued.**

Manhattan Supply Co *..	979.40
Washburn & Moen Co...	2,100.00

*Proposals for ordnance stores for the navy-yard, Washington, D. C., under Bureau advertisement dated September 16, 1891; opened October 6, 1891.*

**Class 2, rivets, nuts, etc.:**

McFadden Co.....	\$1,110.26
J. B. Kendall .....	1,197.58
James B. Lambie.....	1,107.12
J. H. Sternbergh & Son..	1,136.20
Harry L. Briggs *.....	1,103.16

**Class 3, brooms, hardware, etc.:**

White & Dodson.....	881.59
James B. Lambie.....	955.39
Harry L. Briggs *.....	816.91

**Class 4, sand, etc.:**

J. B. Kendal .....	1,997.50
Manhattan Supply Co.*..	1,895.00

**Class 5, canvas, flax:**

Manhattan Supply Co...	232.00
James B. Lambie.....	256.00
Chas. H. Pleasants * .....	210.00

**Class 6, canvas, etc., cotton:**

Geo. L. Neville * .....	299.37
J. B. Kendall .....	363.50
White & Dodson .....	300.07
Manhattan Supply Co...	301.25
James B. Lambie.....	373.00
Chas. H. Pleasants .....	318.55

**Class 7, rope:**

S. C. Forsaith Machine Co	718.25
McFadden Co .....	434.50
J. B. Kendall .....	575.00
Manhattan Supply Co.* ..	297.50
James B. Lambie .....	535.00
Chas. H. Pleasants.....	460.25

**Class 8, dry goods:**

Geo. L. Neville .....	49.75
White & Dodson .....	51.00
Manhattan Supply Co...	37.00
Chas. H. Pleasants * .....	35.21

**Class 10, glass:**

Geo. L. Neville .....	78.50
Geo. Ryneal, jr .....	69.00
Manhattan Supply Co. ...	100.00
James B. Lambie .....	86.00
Chas. Becker * .....	50.40
Chas. H. Pleasants.....	68.78

**Class 11, belting:**

Heim Belting Co .....	4,661.50
Loeb Bros .....	5,185.35
S. C. Forsaith Machine Co.*	4,629.42
J. B. Kendall .....	6,319.60
Manhattan Supply Co....	4,820.50
James B. Lambie .....	5,545.60
Chas. H. Pleasants.....	10,581.31

**Class 12, sheep skins:**

J. B. Kendall .....	1,500.00
Manhattan Supply Co...	930.00
James B. Lambie * .....	700.00
Chas. H. Pleasants.....	719.00

\* Accepted.

**Class 13, white pine:**

Joseph W. Duryce * .....	\$500.00
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**Class 14, tools**

S. C. Forsaith Machine Co.	2,542.42
McFadden Co .....	2,472.97
White & Dodson .....	3,011.25
Manhattan Supply Co...	2,582.74

**Class 15, tin:**

S. C. Forsaith Machine Co.	1,223.75
J. H. Chesley & Co.*.....	1,089.15
Manhattan Supply Co...	1,109.25
James B. Lambie .....	1,325.75

**Class 16, steel**

James B. Lambie * .....	463.00
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**Class 17, iron:**

S. C. Forsaith Machine Co.	391.70
J. B. Kendall .....	363.45
Manhattan Supply Co...	536.50
James B. Lambie .....	358.50
J. H. Sternbergh & Son * ..	343.00

**Class 18, copper:**

J. Friedenstein * .....	12,700.00
S. C. Forsaith Machine Co.	13,100.00
J. B. Kendall .....	15,000.00
J. H. Chesley & Co .....	13,220.00
Manhattan Supply Co...	13,700.00
Lewisohn Bros.†.....	12,700.00

**Class 19, packing:**

Manhattan Supply Co...	617.44
James B. Lambie * .....	413.49

**Class 20, hose:**

McFadden Co .....	111.98
Manhattan Supply Co.*...	91.90
James B. Lambie .....	168.00
Chas. H. Pleasants.....	143.95

**Class 21, Magnesia covering:**

Geo. L. Neville * .....	326.00
H. M. Simmons .....	362.00
H. W. Jahns Manufacturing Co.†.....	264.00
Manhattan Supply Co...	367.00
Chas. H. Pleasants.....	472.00

**Class 22, paints:**

Geo. Ryneal, jr .....	483.93
White & Dodson .....	538.50
Chas. Becker * .....	455.75
Chas. M. Childs & Co....	457.45
Chas. H. Pleasants.....	480.30

**Class 23, oil, sperm:**

Geo. L. Neville .....	90.00
Geo. P. Fiske * .....	71.00
Geo. Ryneal, jr .....	77.50
White & Dodson .....	80.00
Stevenson Bros.....	103.00
Chas. Becker * .....	76.00
Chas. M. Childs & Co....	95.00

**Class 24, alcohol:**

Chas. H. Pleasants*.....	327.80
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† Decided by lot.

*Proposals for ordnance stores for the navy-yard, Washington, D. C., etc.—Continued.*

<b>Class 25, pipe:</b>		<b>Class 32—Continued.</b>	
S. C. Forsaith Machine Co.*	\$794.63	J. B. Kendall	\$2,000.00
<b>Class 26, forage:</b>		J. R. Bowen*	580.00
Chas. H. Pleasants*	111.66	<b>Class 34, petroleum:</b>	
<b>Class 27, miscellaneous:</b>		Geo. L. Neville	100.00
J. B. Kendall	897.66	Geo. Ryneal, jr.	282.50
White & Dodson	975.00	White & Dodson	270.00
Manhattan Supply Co.*	873.00	Stevenson Bros.	300.00
Chas. H. Pleasants	1,086.00	Charles Becker*	85.00
<b>Class 28, tools:</b>		<b>Class 35, lard oil:</b>	
S. C. Forsaith Machine Co.	1,615.38	Geo. L. Neville	114.00
McFadden Co.	1,447.01	Geo. P. Fiske	120.00
White & Dodson	1,453.00	Geo. Ryneal, jr.*	108.00
Manhattan Supply Co.	1,442.54	White & Dodson	112.00
James B. Lambie	1,641.11	Stevenson Bros.	120.00
Tissot & Shultz	1,455.98	Chas. Becker	110.00
James W. Soper	1,448.74	Chas. H. Pleasants	128.00
Harry L. Briggs*	1,388.65	<b>Class 36, paraffin oil:</b>	
<b>Class 29, files:</b>		Geo. L. Neville	180.00
McFadden Co.	1,747.81	Geo. P. Fiske	170.00
G. & H. Barnett	1,780.45	Geo. Ryneal, jr.	150.00
James B. Lambie	1,919.02	Stevenson Bros.	200.00
Tissot & Schultz	1,817.94	Chas. Becker*	130.00
James W. Soper*	1,737.60	<b>Class 37, rape seed and lard oil:</b>	
Harry L. Briggs	1,829.20	Geo. L. Neville*	610.00
<b>Class 30, chemicals:</b>		Geo. P. Fiske	676.00
Geo. Ryneal, jr.	198.03	Geo. Ryneal, jr.	652.00
Manhattan Supply Co.	500.55	White & Dodson	637.00
Chas. H. Pleasants	321.25	Stevenson Bros.	675.00
<b>Class 32, broken stone:</b>		Charles Becker	633.00
Wm. H. Moheer	600.00		

*Proposals for naval supplies for the League Island navy-yard under Bureau advertisement dated September 17, 1891; opened October 6, 1891.*

<b>Class 1, rivets, etc.:</b>		<b>Class 5, charcoal, coke:</b>	
Murta Appleton & Co.	\$50.78	Paul J. Field, jr.*	\$20.25
Billany & Cochrane	62.83	Chas. H. Pleasants	25.00
Chas. J. Field	61.45	<b>Class 6, lanterns and globes:</b>	
Dwight F. Walker	71.06	Murta Appleton & Co.	39.46
Harry L. Briggs*	41.88	Billany & Cochrane*	21.80
Paul J. Field, jr.	65.51	Chas. J. Field	41.80
J. Jacob Shannon & Co.	56.71	Dwight F. Walker	63.00
Chas. H. Pleasants	51.28	J. Jacob Shannon & Co.	56.80
J. W. Gaskill & Sons	80.05	White & Dodson	67.00
<b>Class 2, hardware, etc.:</b>		<b>Class 7, belting, etc.:</b>	
Murta Appleton & Co.	587.88	Murta Appleton & Co.	982.74
Chas. J. Field	559.68	Wm. H. Codd	987.35
Dwight F. Walker	720.28	Dwight F. Walker	1,197.76
Harry L. Briggs*	524.83	Loeb Bros.	841.37
Paul J. Field, jr.	769.78	Pechin Belting Co.	891.28
J. Jacob Shannon & Co.	717.21	Stevenson Bros. & Co.	1,200.70
White & Dodson	678.76	J. Jacob Shannon & Co.	978.04
<b>Class 3, rope, etc.:</b>		Donegan & Swift	935.50
Dwight F. Walker	1,381.23	S. C. Forsaith Machine Co.*	714.50
Edwin H. Fidler*	1,264.68	<b>Class 8, lumber:</b>	
Manhattan Supply Co.	1,412.60	J. W. Gaskill & Sons*	5,788.00
J. Jacob Shannon & Co.	1,383.97	<b>Class 9, tools:</b>	
S. C. Forsaith Machine Co.	1,379.91	Murta Appleton & Co.*	432.84
Charles H. Pleasants	1,275.30	Billany & Cochrane	478.67
J. W. Gaskill & Sons	1,578.66	Chas. J. Field	453.65
<b>Class 4, hair:</b>		Paul J. Field, jr.	689.80
Aquila Rich	87.00	J. Jacob Shannon & Co.	618.55
Manhattan Supply Co.	74.85	White & Dodson	762.30
Stevenson Bros. & Co.	87.00		
Chas. H. Pleasants*	70.50		

\* Accepted.

*Proposals for naval supplies for the League Island navy-yard, etc.—Continued.*

<b>Class 10, iron:</b>		<b>Class 14—Continued.</b>	
Chas. J. Field* .....	\$348.85	Chas. H. Pleasants .....	\$37.50
Dwight F. Walker .....	400.30	Chas. K. Smith & Co....	24.25
Paul J. Field, jr .....	437.00	White & Dodson .....	30.00
J. H. Sternberg & Son...	363.45	<b>Class 15, alcohol:</b>	
Manhattan Supply Co....	552.50	Lewis U. Bean .....	78.00
J. Jacob Shannon & Co..	365.25	Aquila Rich* .....	72.30
S. C. Forsaith Machine Co.	411.15	Chas. H. Pleasants .....	80.40
J. W. Gaskill & Sons....	411.30	<b>Class 16, pipe, etc.:</b>	
<b>Class 11, packing:</b>		Wm. H. Codd .....	505.06
Billany & Cochrane .....	127.05	Chas. J. Field* .....	460.76
Chas. J. Field .....	105.15	Dwight F. Walker .....	549.06
Manhattan Supply Co....	95.50	Donegan & Swift .....	477.40
Columbia Rubber Works		S. C. Forsaith Machine Co.	475.61
Co .....	90.25	J. W. Gaskill & Sons....	715.83
Stevenson Bros. & Co....	152.50	<b>Class 17, oars:</b>	
Chas. H. Pleasants* .....	77.30	Chas. J. Field .....	199.22
J. W. Gaskill & Sons ....	131.50	Dwight F. Walker .....	184.80
<b>Class 12, paints:</b>		Aquila Rich .....	193.90
Dwight F. Walker .....	1,278.25	Chas. H. Pleasants* .....	137.04
Lewis U. Bear & Co .....	1,279.18	J. W. Gaskill & Sons....	348.24
Aquila Rich* .....	1,159.07	<b>Class 18, files:</b>	
Harrison Bros. & Co .....	1,161.40	Billany & Cochrane .....	235.23
J. Jacob Shannon & Co ..	1,312.25	Hayes, Mayer & Co .....	238.03
Chas. M. Childs & Co....	1,181.77	Chas. J. Field* .....	216.35
Chas. H. Pleasants .....	1,192.37	Dwight F. Walker .....	336.04
John Lucas & Co .....	1,291.13	Paul J. Field, jr .....	281.71
White & Dodson .....	1,175.85	Tissot & Shultz .....	225.71
<b>Class 13, oils, sperm:</b>		J. Jacob Shannon & Co..	233.96
Lewis U. Bean & Co....	155.00	<b>Class 19, cotton waste:</b>	
Stevenson Bros. & Co....	171.25	Billany & Cochrane* .....	74.25
Chas. M. Childs & Co.* ..	149.00	Chas. J. Field .....	105.50
Chas. H. Pleasants .....	173.25	Aquila Rich .....	86.25
Chas. K. Smith & Co....	153.81	Manhattan Supply Co....	81.10
White & Dodson .....	155.00	Stevenson Bros. & Co....	87.50
<b>Class 14, oil, cylinder:</b>		J. Jacob Shannon & Co..	107.00
Lewis U. Bean & Co....	45.00	Donegan & Swift .....	77.00
Stevenson Bros. & Co....	30.00	Chas. H. Pleasants .....	77.75
Chas. M. Childs & Co.* ..	20.00	White & Dodson .....	113.00

*Proposals for naval supplies for the navy-yard, Portsmouth, N. H., under Bureau advertisement dated September 15, 1891; opened October 6, 1891.*

<b>Class 1, alcohol:</b>		<b>Class 8, paints—Continued.</b>	
J. B. Morrell & Co .....	\$10.50	Charles H. Pleasants .....	\$55.22
Aquila Rich* .....	7.77	Gould & Cutler Corpora-	
Charles H. Pleasants .....	8.37	tion* .....	53.48
Gould & Cutler Corpora-		<b>Class 9, beeswax, etc.:</b>	
tion .....	8.25	Manhattan Supply Co....	36.10
<b>Class 2, brushes:</b>		J. B. Morrell & Co .....	38.20
J. B. Morrell & Co.* .....	46.49	Aquila Rich* .....	26.15
Charles H. Pleasants .....	69.88	Chas. M. Childs & Co....	76.00
<b>Class 3, lime:</b>		Charles H. Pleasants .....	43.45
Aquila Rich* .....	2.89	<b>Class 10, rivets:</b>	
Charles H. Pleasants .....	3.50	J. H. Sternbergh & Son ..	45.00
<b>Class 4, canvas, etc.:</b>		Eugene L. Maxwell* .....	37.00
S. C. Forsaith Machine Co.	88.38	S. C. Forsaith Machine Co.	46.00
Manhattan Supply Co....	82.28	J. B. Morrell & Co .....	52.50
J. B. Morrell & Co .....	82.84	Harry L. Briggs .....	43.50
Charles H. Pleasants* .....	77.74	<b>Class 11, steel:</b>	
<b>Class 5, dry goods:</b>		Eugene L. Maxwell* .....	187.20
Manhattan Supply Co....	178.05	<b>Class 12, iron:</b>	
J. B. Morrell & Co .....	156.62	S. C. Forsaith Machine	
Ansel W. Paine .....	144.50	Co.* .....	79.70
Harry L. Briggs* .....	129.32	<b>Class 14, pipe, etc.:</b>	
<b>Class 8, paints:</b>		William C. Codd* .....	164.75
Aquila Rich .....	69.00	S. C. Forsaith Machine Co.	166.79
Charles M. Childs & Co..	56.37		

\* Accepted.

*Proposals for naval supplies for Naval Academy, Annapolis, Md., under Bureau advertisement dated September 19, 1891; opened October 6, 1891.*

<b>Class 1, rivets, etc:</b>		<b>Class 5, hose—Continued.</b>	
White & Dodson .....	\$37. 10	White & Dodson .....	\$60. 00
J. H. Chesley & Co.* .....	25. 82	Chas. H. Pleasants* .....	31. 25
<b>Class 2, dry goods:</b>		<b>Class 6, paints:</b>	
White & Dodson t. ....	62. 70	White & Dodson .....	90. 75
<b>Class 3, lumber:</b>		Chas. H. Pleasants .....	73. 69
Wm. D. Gill & Son * .....	56. 00	Aquila Rich* .....	69. 70
<b>Class 4, tools:</b>		<b>Class 7, soap:</b>	
S. C. Forsaith Machine Co.* .....	349. 57	White & Dodson .....	17. 50
White & Dodson .....	469. 25	Chas. H. Pleasants .....	10. 25
<b>Class 5, hose:</b>		Aquila Rich .....	12. 00
S. C. Forsaith Machine Co. ....	42. 50		

*Proposals for naval supplies for the New York navy-yard, under Bureau advertisement dated September 22, 1891; opened October 6, 1891.*

<b>Class 1, screw bolts:</b>		<b>Class 4, spikes—Continued:</b>	
Eugene L. Maxwell .....	\$438. 36	Wm. A. Wheeler .....	\$83. 58
Geo. L. Neville .....	780. 00	<b>Class 5, T-rails, etc.:</b>	
Greenlie, Wyatt & Co. ....	421. 20	J. B. Morrell & Co.† .....	2, 752. 50
Harry L. Briggs .....	421. 20	Wm. A. Wheeler .....	4, 446. 50
Wm. C. Codd .....	507. 00	<b>Class 6, drills, etc.:</b>	
Manhattan Supply Co. ....	433. 68	Eugene L. Maxwell .....	419. 30
J. B. Morrell & Co. ....	421. 20	Harry L. Briggs .....	445. 26
Wm. A. Wheeler .....	463. 32	James W. Soper .....	512. 26
Penna. Bolt and Nut Co.* ..	366. 60	Manhattan Supply Co.* ..	395. 15
J. H. Sternbergh & Son. ....	421. 20	Tissot & Schultz .....	426. 23
<b>Class 2, lumber:</b>		<b>Class 7, boiler tubes:</b>	
John McClave .....	3, 221. 00	Eugene L. Maxwell† .....	2, 734. 00
Watson & Pittinger .....	3, 163. 00	Wm. C. Codd† .....	3, 932. 70
Joseph W. Duryee .....	3, 398. 00	Edward Barr Co.† .....	5, 482. 00
James Bigler .....	3, 911. 00	<b>Class 8, lumber:</b>	
Higgins Bros.* .....	2, 955. 00	John McClave .....	399. 50
Chas. E. Pell .....	4, 795. 00	Watson & Pittinger .....	492. 00
<b>Class 3, bolts:</b>		Joseph W. Duryee .....	442. 00
Eugene L. Maxwell .....	258. 52	Higgins Bros.* .....	337. 00
Geo. L. Neville .....	460. 00	Chas. E. Pell .....	508. 65
Greenlie, Wyatt & Co. ....	248. 00	<b>Class 9, tin:</b>	
Harry L. Briggs .....	258. 40	Eugene L. Maxwell .....	483. 00
Wm. C. Codd .....	299. 00	Chas. H. Pleasants .....	1, 112. 00
Manhattan Supply Co. ....	255. 76	Manhattan Supply Co. ....	509. 00
J. B. Morrell & Co. ....	248. 40	Aquila Rich* .....	476. 40
Wm. A. Wheeler .....	273. 24	J. B. Morrell & Co. ....	501. 00
Penna. Bolt and Nut Co.* ..	216. 20	Wm. A. Wheeler .....	523. 40
J. H. Sternbergh & Son .....	248. 40	<b>Class 10, tongs:</b>	
<b>Class 4, spikes.</b>		Manhattan Supply Co. ....	54. 80
Eugene L. Maxwell .....	62. 86	Tissot & Schultz* .....	49. 60
Chas. H. Pleasants* .....	35. 70	<b>Class 11, burlaps:</b>	
Harry L. Briggs .....	74. 20	Chas. H. Pleasants .....	784. 00
Manhattan Supply Co. ....	83. 58	Manhattan Supply Co.* ..	357. 30
Aquila Rich .....	98. 00	Tissot & Schultz .....	366. 00
J. B. Morrell & Co. ....	84. 00	J. B. Morrell & Co. ....	370. 00

*Proposals for hemp, etc., for the Boston navy-yard, under Bureau advertisement dated September 21, 1891; opened October 6, 1891.*

<b>Class 1, manila hemp:</b>		<b>Class 3, American hemp:</b>	
Pearson Cordage Co.,		R. C. Morgan & Co., per	
per ton* .....	\$175. 84	ton* .....	\$184. 80
Manhattan Supply Co.,		Manhattan Supply Co.,	
per ton .....	203. 33	per ton .....	186. 67
George H. Allen, per ton † ..	173. 60	S. C. Forsaith Machine	
S. C. Forsaith Machine		Co., per ton .....	193. 00
Co., per ton .....	189. 20	<b>Class 4, oak piles:</b>	
<b>Class 2, Russian hemp:</b>		J. N. Hays & Co .....	225. 00
A. Davis Weld, per ton* ..	164. 50	Geo. H. Cavanaugh* .....	156. 00
S. C. Forsaith Machine		<b>Class 5, driving piles:</b>	
Co., per ton .....	182. 00	J. N. Hayes & Co.* .....	630. 00
		Geo. H. Cavanaugh .....	875. 00

\* Accepted.

† No award—O. P.

‡ Informal.

*Proposals for papering walls, etc., for Naval Training Station, Newport, R. I., under Bureau advertisement dated September 14, 1891; opened October 6, 1891.*

## Class 2:

Joseph Mayer.....	\$289.98
A. C. Titus Co.*.....	249.00

*Proposals for naval supplies for the navy-yard, Mare Island, California, under Bureau advertisement dated September 18, 1891; opened October 13, 1891.*

Class 1, gratings:		Class 7, cement—Continued.	
Miller Sloss & Scott.....	\$386.40	Risdon Iron and Locomotive Works.....	\$221.25
Risdon Iron and Locomotive Works*.....	370.30	Wm. Walker.....	251.25
John P. McCormick.....	558.35	Aden Brothers.....	281.25
Class 2, bolts, etc.:		A. S. Carman.....	225.00
Miller Sloss & Scott.....	42.98	Class 8, traveling crane:	
Risdon Iron and Locomotive Works.....	29.40	Yale & Towne Manufacturing Co.*.....	425.00
Dunham, Carrigan & Hayden Co.*.....	26.94	Miller Sloss & Scott.....	510.00
Class 3, brick, etc.:		Risdon Iron and Locomotive Works.....	499.00
A. Powell*.....	383.40	Class 9, steel rails:	
Risdon Iron and Locomotive Works.....	412.40	Miller Sloss & Scott*.....	108.00
Wm. Walker.....	402.55	Risdon Iron and Locomotive Works.....	121.50
Aden Brothers.....	450.25	Thompson C. Gill & Co..	120.00
A. S. Carman.....	406.50	Class 10, lumber:	
Class 4, wire nettings:		A. Powell*.....	120.27
Risdon Iron and Locomotive Works.....	511.37	Risdon Iron and Locomotive Works†.....	112.42
Washburn and Moen Manufacturing Co.*.....	483.10	Wm. Walker.....	141.18
John P. McCormick.....	710.89	A. S. Carman.....	125.49
Class 5, iron plates:		F. W. Kreling & Sons.....	131.00
Miller Sloss & Scott.....	419.87	Class 11, angle bars:	
Risdon Iron and Locomotive Works.....	433.57	Carnegie, Phipps & Co..	368.84
Dunham, Carrigan & Hayden Co.*.....	380.41	Miller, Sloss & Scott.....	550.26
Class 6, pipe, etc.:		Risdon Iron and Locomotive Works*.....	275.12
Miller Sloss & Scott.....	87.75	Class 12, lumber:	
Risdon Iron and Locomotive Works.....	99.37	A. Powell.....	230.00
Dunham, Carrigan & Hayden Co.*.....	80.59	Risdon Iron and Locomotive Works†.....	205.00
Class 7, cement:		Wm. Walker.....	210.00
A. Powell*.....	210.00	A. S. Carman.....	199.50
		F. W. Kreling & Sons*.....	190.00

*Proposals for steel, etc., for the navy-yard, Washington, D. C., under Bureau advertisement dated September 26, 1891; opened October 13, 1891.*

Class 1:		Class 2—Continued:	
Carnegie, Phipps & Co..	\$5,168.00	Thompson C. Gill & Co..	\$657.06
E. J. Temple.....	3,646.60	Manhattan Supply Co...	942.40
Benj. Atha & Illingworth Co.*.....	3,047.20	Hicks & Dickey.....	665.10
Midvale Steel Co.....	4,688.00	J. B. Kendall.....	644.00
Carpenter Steel Co.....	6,086.00	Class 3:	
J. B. Kendall.....	4,943.00	Carnegie, Phipps & Co..	220.00
Class 2:		Benj. Atha & Illingworth Co.*.....	120.00
Carnegie, Phipps & Co..	949.00	Midvale Steel Co.....	160.00
S. C. Forsaith Mch. Co..	651.54	Carpenter Steel Co.....	400.00
J. H. Sternbergh & Son *	629.40	J. B. Kendall.....	320.00

\*Accepted.

† Informal.



*Proposals for coffee, etc., for the New York navy-yard, under Bureau advertisement dated October 10, 1891; opened October 27, 1891.*

<b>Class 1, 50,000 pounds coffee:</b>		<b>Class 11, cotton line:</b>	
Francis H. Leggett & Co.*	\$0.18 <sup>33</sup> / <sub>100</sub>	Manhattan Supply Co...	\$97.00
Chas. E. Ahrens†	.16 <sup>49</sup> / <sub>100</sub>	Hans Hemken	180.00
Thos. W. Ormiston	.17 <sup>70</sup> / <sub>100</sub>	Thos. W. Ormiston*	89.07
ton. } Bid B.	.15 <sup>97</sup> / <sub>100</sub>	Chas. H. Pleasants	97.75
<b>Class 2, 150,000 pounds S. W. soap:</b>		J. B. Morrell & Co.	95.00
Manhattan Supply Co.*	.03 <sup>88</sup> / <sub>100</sub>	Tissot & Schultz	93.75
Chas. McKeone's Sons	.04 <sup>97</sup> / <sub>100</sub>	Joseph Wechsler	107.00
<b>Class 3, twills:</b>		<b>Class 12, mattress ticking:</b>	
Manhattan Supply Co...	208.20	Manhattan Supply Co...	565.42
Tissot & Schultz*	202.50	J. B. Morrell & Co.	626.25
Joseph Wechsler	232.50	Tissot & Schultz	579.98
<b>Class 4, sewing silk, etc.:</b>		Joseph Wechsler	611.28
Hans Hemken	434.00	<b>Class 13, hardware:</b>	
Nonotuck Silk Co.*	375.00	Manhattan Supply Co.*	145.22
Tissot & Schultz	483.75	J. B. Morrell & Co.	149.00
Joseph Wechsler	382.50	Tissot & Schultz	158.84
<b>Class 5, basting cotton, etc.:</b>		Joseph Wechsler	190.51
Manhattan Supply Co.*	175.60	Francis T. Witte Hard-	
Hans Hemken	292.50	ware Co.	389.30
Tissot & Schultz	232.00	<b>Class 14, paints:</b>	
Joseph Wechsler	252.00	Chas. M. Childs & Co.	178.40
<b>Class 6, cap leathers:</b>		Chas. H. Pleasants	179.10
Tissot & Schultz*	226.16	Aquila Rich*	172.05
Joseph Wechsler	277.25	J. B. Morrell & Co.	188.00
<b>Class 7, rubber buttons:</b>		Wm. McDonagh & Co.	177.15
Manhattan Supply Co...	195.00	Jas. H. Taylor	186.15
Hans Hemken	196.50	<b>Class 15, alcohol:</b>	
India Rubber Comb Co.	195.00	Chas. H. Pleasants	49.20
Tissot & Schultz	200.00	Aquila Rich*	48.40
Joseph Wechsler*	187.50	<b>Class 16, grommets:</b>	
<b>Class 8, brushes:</b>		Manhattan Supply Co...	157.00
Manhattan Supply Co...	45.20	J. B. Morrell & Co.	155.50
Hans Hemken	70.00	Tissot & Schultz*	149.50
Chas. M. Childs & Co.	35.00	Francis T. Witte Hard-	
Aquila Rich	37.86	ware Co.	166.00
J. B. Morrell & Co.*	31.00	<b>Class 17, soap and miscellaneous:</b>	
Wm. McDonagh & Co.	44.00	Manhattan Supply Co...	65.00
Tissot & Schultz	35.30	Chas. M. Childs & Co.	87.50
<b>Class 9, cotton duck, etc.:</b>		Thos. W. Ormiston	68.49
Manhattan Supply Co...	633.20	Chas. H. Pleasants*	56.73
J. B. Morrell & Co.*	620.00	Aquila Rich	64.75
Tissot & Schultz	635.00	J. B. Morrell & Co.	63.75
<b>Class 10, flax duck, etc.:</b>		Wm. McDonagh & Co.	67.25
Manhattan Supply Co.†	825.00		
J. B. Morrell & Co.*	856.25		

*Proposals for steam capstan, windlass, etc., for the Norfolk navy-yard, under Bureau advertisement dated October 9, 1891; opened October 27, 1891.*

<b>Class 1, steam capstan and windlass, etc.:</b>		<b>Class 4, cement:</b>	
American Ship Windlass Co.*	\$7,758.00	Chas. H. Pleasants	\$48.75
<b>Class 2, hoisting machine:</b>		Geo. L. Neville	44.85
Manhattan Supply Co...	940.00	Aquila Rich	58.50
Morse, Williams & Co.	576.00	Thompson C. Gill & Co.	57.00
Ellicott Machine Co.*	448.00	Hans Hernken	74.25
S. C. Forsaith Machine Co.	582.50	Niemeyer & Co.	44.70
<b>Class 3, tallow, etc.:</b>		John C. Emerson	60.00
Manhattan Supply Co...	764.75	<b>Class 5, paving cement, etc.:</b>	
Chas. H. Pleasants*	583.30	Warren Chemical and	
Fiske Brothers	604.37	Manufacturing Co.	413.75
Mayer & Co.	639.00	Geo. L. Neville	386.37
Geo. L. Neville	763.00	Niemeyer & Co.*	376.25
Aquila Rich	692.50	<b>Class 6, asphalt:</b>	
Chas. M. Childs & Co.	655.00	Neuchatel Asphalt Co.	
		(limited)*	70.00
		Geo. L. Neville	110.00

\* Accepted.

† Informal.

*Proposals for steam capstain, windless, etc., for Norfolk navy-yard, etc.—Continued.***Class 7, coal tar, etc.:**

Manhattan Supply Co...	\$90.00
Chas. H. Pleasants .....	97.50
Mayer & Co.* .....	60.00
Geo. L. Neville .....	85.00
Aquila Rich .....	92.50
Chas. M. Childs .....	155.00
Niemeyer & Co. ....	112.50

**Class 8, emery wheels:**

Manhattan Supply Co ...	144.00
S. C. Forsaith Machine Co.	180.50
Mayer & Co. ....	152.00
Geo. L. Neville .....	159.90
Aquila Rich* .....	105.00
Tissot & Schultz .....	152.36

**Class 9, tools:**

Manhattan Supply Co...	\$98.48
S. C. Forsaith Machine Co.	108.24
Mayer & Co. ....	97.50
Geo. L. Neville .....	109.26
Tissot & Schultz* .....	93.84

**Class 10, lumber:**

Geo. L. Neville .....	1,064.00
J. W. Gaskill & Sons*...	1,062.00
Niemeyer & Co .....	1,746.00
John C. Emerson .....	1,252.00

*Proposals for building materials, etc., for the League Island navy-yard, under Bureau advertisement; dated October 7, 1891; opened October 27, 1891.***Class 1, brick, etc.:**

Niemeyer & Co.* .....	\$236.00
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**Class 2, cement:**

Niemeyer & Co. ....	83.75
Chas. H. Pleasants .....	81.25
Aquila Rich .....	77.50
Morris Ebert* .....	70.00
S. C. Forsaith Machine Co.	81.25
Thompson C. Gill & Co..	81.00

**Class 3, lumber, etc.:**

Jas. Gaskill & Sons .....	481.00
Niemeyer & Co. ....	677.05
Dwight F. Walker .....	568.75

**Class 4, corrugated iron:**

Niemeyer & Co. ....	\$240.00
Paul J. Field, jr .....	165.00
S. C. Forsaith Machine Co.	164.10
Thompson C. Gill & Co.*	148.50
Dwight F. Walker .....	150.00

**Class 5, tallow, etc.:**

Chas. J. Field .....	14.63
Niemeyer & Co .....	22.50
Chas. H. Pleasants* .....	11.24
Aquila Rich .....	13.50
Paul J. Field, jr .....	16.50

*Proposals for brick, etc., for the Boston navy-yard, under Bureau advertisement dated October 8, 1891; opened October 27, 1891.***Class 1, brick, etc.:**

Manhattan Supply Co ...	\$1,751.70
Fiske, Coleman & Co....	1,589.01
Niemeyer & Co. ....	1,735.98
S. C. Forsaith Machine Co.* .....	1,262.42

**Class 2, nails, etc.:**

Thompson C. Gill & Co.*	\$30.64
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**Class 3, corrugated iron:**

Manhattan Supply Co ...	1,248.99
Thompson C. Gill & Co.*	907.01
S. C. Forsaith Machine Co.	984.19

*Proposals for sheet lead, etc., for the Mare Island navy-yard, under Bureau advertisement dated October 6, 1891; opened November 3, 1891.***Class 1, sheet lead:**

L. M. Kellogg .....	\$355.20
Colwell Lead Co.* .....	336.00
Albert Gallatin .....	342.00
Charles H. Pleasants .....	340.32
Aquila Rich .....	337.92
Thompson C. Gill & Co..	420.00

**Class 1—Continued.**

Miller, Sloss & Scott ....	\$355.20
S. C. Forsaith Machine Co.	427.20

**Class 2, asbestos, etc.:**

Isaac L. Merrell .....	774.00
Charles H. Pleasants .....	283.02
Aquila Rich .....	321.18
Miller, Sloss & Scott ....	486.00

*Proposals for naval supplies for the New York navy-yard, under Bureau advertisement dated October 20, 1891; opened November 10, 1891.***Class 1, 2,500 feet leading hose:**

Revere Rubber Co. ....	\$2,400.00
William A. Wheeler .....	1,925.00
Hans Hernken .....	1,975.00
Gutta Percha and Rubber Manufacturing Co.	2,500.00
J. B. Monell & Co. ....	2,450.00
Aquila Rich .....	1,975.00

**Class 2, 3,000 yards tan duck:**

Tissot & Schultz .....	\$657.00
Manhattan Supply Co...	672.20
Hans Hernken .....	720.00
J. B. Morrell & Co.* .....	607.20

**Class 3, 30,000 yards unbleached duck:**

Tissot & Schultz* .....	2,772.00
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\*Accepted.

*Proposals for naval supplies for the New York navy-yard, etc.—Continued.*

<b>Class 3—Continued.</b>		<b>Class 8—Continued.</b>	
Manhattan Supply Co.	\$2,829.00	William H. Williams	\$192.00
William A. Wheeler	2,991.00	Joseph W. Duryee	252.00
Hans Hernken	3,258.00	Watson & Pittinger	240.00
J. B. Morrell & Co.	2,922.00	<b>Class 9, brushes, etc.:</b>	
<b>Class 4, 5,000 yards bleached duck:</b>		Tissot & Schultz	483.94
Tissot & Schultz *	585.00	Manhattan Supply Co.	506.25
Manhattan Supply Co.	596.50	Harry L. Briggs	462.67
Hans Hernken	700.00	Ira B. White *	401.90
J. B. Morrell & Co.	624.50	J. B. Morrell & Co.	447.67
<b>Class 5, 5,000 yards cap cloth:</b>		<b>Class 10, paints:</b>	
Sullivan, Vail & Co.	9,297.50	Charles M. Childs & Co.	1,497.50
Wendell, Fay & Co.	9,274.50	Charles H. Pleasants	1,518.86
B. Z. Pippey & Co.	9,700.00	William McDonagh & Co.	1,472.40
<b>Class 6, 5,000 pairs woolen socks:</b>		Ira B. White	1,481.00
Joy, Langdon & Co.	1,600.00	J. B. Morrell & Co.	1,459.60
B. Z. Pippey & Co. *	1,525.00	Aquila Rich	1,475.72
<b>Class 7, white pine:</b>		<b>Class 11, tools:</b>	
Charles E. Pell	846.00	Tissot & Schultz	141.60
Joseph W. Duryee	1,020.00	Manhattan Supply Co.	127.64
Watson & Pittinger *	635.00	Harry L. Briggs *	96.96
<b>Class 8, mahogany:</b>		Ira B. White	119.90
Charles E. Pell *	156.00	J. B. Morrell & Co.	112.72
		<b>Class 12, yellow pine:</b>	
		Joseph W. Duryee	1,931.76
		Watson & Pittinger *	1,475.65

*Proposals for coal, etc., for the Norfolk navy-yard, under Bureau advertisement dated October 23, 1891; opened November 10, 1891.*

<b>Class 1, glass lenses:</b>		<b>Class 4, thumb vises:</b>	
Manhattan Supply Co.	\$52.92	Ira B. White *	\$7.50
Thompson C. Gill & Co.	104.40	Geo. L. Neville	12.00
Geo. L. Neville	180.00	<b>Class 5, tail screw:</b>	
Chas. H. Pleasants *	41.04	Manhattan Supply Co. *	21.00
<b>Class 2, coal:</b>		Thompson C. Gill & Co.	30.00
David Duncan & Son	1,010.00	Ira B. White	99.00
Thompson C. Gill & Co.	1,042.50	Geo. L. Neville	22.50
Niemeyer & Co. *	947.00	<b>Class 6, pipe:</b>	
Geo. L. Neville	1,500.00	Manhattan Supply Co.	436.80
Chas. H. Pleasants	963.00	Thompson C. Gill & Co.	352.00
E. C. Brooks & Co.	1,150.00	Colwell Lead Co.	396.80
<b>Class 3, dining suite, etc.:</b>		S. C. Forsaith Machine Co.	396.80
Manhattan Supply Co.	255.90	Ira B. White	409.60
S. C. Forsaith Machine Co.	262.88	George L. Neville *	292.80
Geo. L. Neville *	244.40	Chas. H. Pleasants	369.60

*Proposals for naval supplies for the naval torpedo station, Newport, R. I., under Bureau advertisement dated October 24, 1891; opened November 10, 1891.*

<b>Class 1, glass:</b>		<b>Class 6, twine:</b>	
Ansel W. Paine	\$383.20	Chas. H. Pleasants *	\$26.82
Swinburn, Peckham & Co.	223.11	<b>Class 7, hardware:</b>	
Manhattan Supply Co.	294.55	Ansel W. Paine	563.07
Chas. H. Pleasants *	184.13	Swinburn, Peckham & Co. †	494.06
<b>Class 2, maple:</b>		Manhattan Supply Co.	404.71
Swinburn, Peckham & Co. *	16.25	Chas. H. Pleasants *	397.67
<b>Class 3, lime:</b>		<b>Class 8, tools:</b>	
Chas. H. Pleasants	21.05	Ansel W. Paine	817.31
<b>Class 5, sulphuric acid, etc.:</b>		Manhattan Supply Co.	466.48
Chas. M. Childs & Co.	623.49	Tissot & Schultz *	350.37
Manhattan Supply Co.	852.00	<b>Class 9, metals:</b>	
Fiske Bros.	562.00	Colwell Lead Co.	91.45
Chas. H. Pleasants	467.73	Manhattan Supply Co.	110.90
Aquila Rich	408.50	Thompson C. Gill & Co.	114.15
		Chas. H. Pleasants *	86.60

\* Accepted.

† Withdrawn.

*Proposals for naval supplies for the naval torpedo station, Newport, R. I., etc.—Continued.*

Class 10, galvanized iron:		Class 14—Continued.	
S. C. Forsaith Machine Co.*	\$129. 12	Aquila Rich*	382. 00
Class 11, steel:		Class 15, alcohol:	
Manhattan Supply Co.	101. 60	Chas. H. Pleasants	173. 20
Thompson C. Gill & Co.*	\$61. 53	Aquila Rich*	158. 00
Midvale Steel Co.	72. 90	Class 16, oils:	
Aquila Rich	92. 92	Chas. M. Childs & Co.	43. 70
Class 12, iron:		Fiske Bros. *	39. 05
Manhattan Supply Co.	216. 50	Chas. H. Pleasants	36. 90
Thompson C. Gill & Co.	149. 35	Tissot & Schultz	41. 00
J. H. Sternbergh & Son*	137. 40	Class 17, pipe, etc.:	
Aquila Rich	216. 28	Donegan & Swift*	519. 87
Class 13, Rubber, etc.:		Colwell Lead Co.	557. 11
Chas. H. Pleasants*	38. 50	Manhattan Supply Co.	564. 55
Aquila Rich	169. 29	S. C. Forsaith Machine Co	1, 251. 71
Class 14, paints:		Wm. C. Codd	1, 276. 75
Gould & Cutler Corporation	449. 67	Class 18, hose:	
Chas. M. Childs & Co.	401. 10	Chas. H. Pleasants	47. 25
Chas. H. Pleasants	\$391. 40	Aquila Rich*	39. 00
		Class 19, stationery:	
		Chas. H. Pleasants *	15. 54

*Proposals for machine tools for the navy-yard, Portsmouth, N. H., under Bureau advertisement dated October 22, 1891, opened November 10, 1891.*

Class 1, shearing machine:		Class 6, drilling machine:	
Morgan Engineering Co.	\$3, 200. 00	Niles Tool Works*	\$624. 00
Niles Tool Works	2, 349. 00	S. C. Forsaith Machine Co.	742. 00
S. C. Forsaith Machine Works	2, 410. 00	Universal Radial Drill Co.	730. 00
Bement, Miles & Co.*	2, 100. 00	Bement, Miles & Co.	1, 150. 00
Wm. Sellers & Co. (incorporated)	3, 940. 00	Class 7, pulley blocks:	
Hilles & Jones Co.	2, 380. 00	Yale & Towne Manufacturing Co.*	152. 50
Class 2, punching and shearing machine:		S. C. Forsaith Machine Co.	167. 50
Morgan Engineering Co.	5, 050. 00	Thompson C. Gill & Co.	440. 00
Niles Tool Works	4, 805. 00	Class 8, engine:	
S. C. Forsaith Machine Co.*	3, 737. 00	Phœnix Iron Co.	2, 200. 00
Bement, Miles & Co.	4, 800. 00	S. C. Forsaith Machine Co.	2, 425. 00
Wm. Sellers & Co.	6, 694. 00	Geo. Place	2, 650. 00
Hilles & Jones Co.	4, 452. 00	Southwark Foundry and Machine Co.	3, 950. 00
Class 3, bending machine:†		Walter L. Clark*	2, 095. 00
Niles Tool Works	15, 250. 00	Class 9, shafting:	
S. C. Forsaith Machine Co.	14, 470. 00	S. C. Forsaith Machine Co.	566. 86
Bement, Miles & Co.	10, 500. 00	Geo. Place	443. 33
Class 4, cutting-off machine:		Walter L. Clark	500. 66
The Newton Machine Tool Works *	1, 700. 00	Wm. Sellers & Co. (incorporated)*	424. 88
Class 5, planing machine:		Thompson C. Gill & Co.	598. 70
Niles Tool Works	4, 485. 00	Class 10, scroll and resawing machine:	
S. C. Forsaith Machine Co.	4, 148. 00	Cordesman Machine Co.*	530. 00
Bement, Miles & Co.*	3, 800. 00	Geo. Place	819. 00
Wm. Sellers & Co. (incorporated)	4, 298. 00	Egan Co.	750. 00
Hilles & Jones Co.	4, 192. 00		

\* Accepted.

† No award.

*Naval supplies for the New York navy-yard, under Bureau advertisement dated November 3; opened November 24, 1891.*

<b>Class 1, 5,000 pairs woolen socks:</b>		<b>Class 4, belting—Continued.</b>	
Hans Hemkent.....	\$0.32	Chas. A. Schieren & Co..	\$606.05
B. Y. Pippey & Co.*.....	.33	Henry S. Manning.....	604.00
<b>Class 2, 7,000 pairs calfskin shoes:</b>		S.C. Forsaith Machine Co.	510.85
Tissot & Schuetz*.....	1.56	J. B. Kendall.....	574.10
The J. Freeman Shoe Manufacturing Co.....	1.61	Newark Leather Belting.	607.45
Joseph Wechsler.....	1.574	Chas. H. Pleasants.....	506.75
<b>Class 3 A, boiler tubes:</b>		J. R. Stine & Co.....	490.45
Cornell, Hiscox & Underhill.....	1,620.00	<b>Class 5, rivet steel:</b>	
Thompson C. Gill & Co..	1,605.00	Manhattan Supply Co...	2,233.00
Henry S. Manning.....	1,730.00	Wm. H. Spowers.....	2,100.00
S. C. Forsaith Machine Co.*.....	1,001.00	Thompson C. Gill & Co..	2,583.00
<b>Class 3 B, boiler tubes:</b>		Park Bros. & Co., { Bid A.	2,100.00
Wm. A. Wheeler*.....	4,356.00	limited..... { Bid B.	2,800.00
Wm. H. Spowers.....	4,571.00	S.C. Forsaith Machine Co.	2,740.00
Cornell, Hiscox & Underhill.....	4,586.00	J. B. Kendall.....	2,170.00
Thompson C. Gill & Co..	5,965.00	Aquila Rich.....	2,313.00
Henry S. Manning.....	4,779.00	Midvale Steel Co.....	2,450.00
<b>Class 4, belting:</b>		J. H. Sternbergh & Son..	2,275.00
Manhattan Supply Co...	574.80	Benjamin Atha & Illingworth Co.*.....	1,890.00
Wm. A. Wheeler.....	757.80	Temple & Lockwood....	2,310.00
Graton & Knight Manufacturing Co.....	522.40	<b>Class 6, slab zinc:</b>	
E. B. Preston & Co.....	598.50	Manhattan Supply Co...	1,632.00
Wm. C. Codd.....	621.70	Wm. A. Wheeler.....	1,611.00
Page Belting Co*.....	459.25	J. B. Monell & Co.....	1,710.00
Loeb Brothers.....	503.00	Hans Hemken.....	2,700.00
		J. Friedenstein*.....	1,482.00
		Thompson C. Gill & Co..	1,800.00
		S.C. Forsaith Machine Co.	1,530.00
		Colwell Lead Co.....	1,545.00
		Aquila Rich.....	1,587.00

*Proposals for naval supplies navy-yard and naval hospital, Norfolk, Va., under Bureau advertisement dated November 7, 1891; opened November 24, 1891.*

<b>Class 1, brooms and brushes:</b>		<b>Class 4, sister hook, etc.—Continued.</b>	
Manhattan Supply Co.*.....	\$222.00	Chas. H. Pleasants*.....	\$64.00
Ira B. White.....	245.00	J. B. Morrell & Co.....	87.80
J. B. Morrell & Co.....	285.00	S.C. Forsaith Machine Co.	139.80
Niemeyer & Co.....	307.50	Niemeyer & Co.....	116.05
Harry L. Briggs.....	244.50	Harry L. Briggs.....	81.65
Geo. L. Neville.....	270.00	Geo. L. Neville.....	64.25
<b>Class 2, hammock and bag canvas:</b>		Aquila Rich.....	121.45
J. B. Morrell & Co.....	328.50	<b>Class 5, beeswax:</b>	
Niemeyer & Co.....	416.00	Manhattan Supply Co...	54.00
Geo. L. Neville*.....	296.75	Chas. H. Pleasants*.....	36.00
<b>Class 3, lanterns, etc:</b>		J. B. Morrell & Co.....	46.50
Manhattan Supply Co...	289.50	S.C. Forsaith Machine Co.	49.50
Ira B. White.....	293.00	Niemeyer & Co.....	49.50
Niemeyer & Co.....	319.50	Geo. L. Neville.....	41.23
Wm. Porter's Sons.....	294.00	Aquila Rich.....	45.00
Harry L. Briggs*.....	265.00	Stevenson Bros. & Co.....	49.50
George L. Neville.....	288.50	<b>Class 6, electrical supplies:</b>	
<b>Class 4, sister hook, etc:</b>		Manhattan Supply Co...	1,558.20
Manhattan Supply Co...	93.35	Western Electric Co*....	1,147.40
Wm. A. Wheeler.....	104.90	Geo. L. Neville.....	1,241.82
Ira B. White.....	106.75	O. Emerson Smith.....	1,836.87

\* Accepted.

† Informal.

*Proposals for naval supplies for the navy-yard, Washington, D. C., under Bureau advertisement dated November 4, 1891; opened November 24, 1891.*

## Class 1, belting:

Manhattan Supply Co . . .	\$1, 025. 85
Wm. A. Wheeler . . . . .	1, 380. 86
E. B. Preston & Co . . . .	1, 055. 80
Graton & Knight M'fg Co . . . . .	753. 05
S. C. Forsaith Machine Co .	857. 82
Loeb Bros . . . . .	905. 89
Chas. Schierer & Co . . . .	1, 059. 86
Donegan & Swift . . . . .	1, 080. 46
Heim Belting Co . . . . .	792. 79
Melville Lindsay . . . . .	754. 58
Morton Reed & Co . . . . .	836. 68
J. B. Kendall . . . . .	1, 038. 32
J. R. Stine & Co . . . . .	836. 82
Page Belting Co . . . . .	800. 52
Chas. H. Pleasants * . . . .	739. 15
Wm. C. Codd . . . . .	1, 115. 07

## Class 2, hydraulic jacks:

Manhattan Supply Co . . .	218. 00
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## Class 2—Continued.

Wm. A. Wheeler . . . . .	\$218. 00
Ira B. White . . . . .	222. 00
S. C. Forsaith Machine Co .	199. 00
Donegan & Swift * . . . .	190. 14
Reuter & Mallory . . . . .	195. 00
Chas. H. Pleasants . . . . .	209. 88
Thompson C. Gill & Co . .	212. 00
Wm. C. Codd . . . . .	199. 00

## Class 3, charcoal foundry iron:

S. C. Forsaith Ma- { bid A	2, 375. 00
chine Co . . . . . { bid B	1, 950. 00
J. B. Kendall * . . . . .	1, 890. 00
Thompson C. Gill . . . . .	2, 075. 00

## Class 4, forgings:

Midvale Steel Co * . . . .	189. 00
Carpenter Steel Co . . . .	54. 00

## Class 5, forgings:

Midvale Steel Co . . . . .	1, 373. 76
Carpenter Steel Co * . . .	572. 40

*Proposals for naval supplies for the League Island navy-yard, under Bureau advertisement dated November 6, 1891; opened November 24, 1891.*

## Class 1, cot duck, etc.:

Dwight F. Walker . . . . .	\$26. 56
J. B. Morrell & Co. * . . . .	20. 28

## Class 2, oilers, etc.:

Charles J. Field . . . . .	19. 49
Ford & Kendig Co . . . . .	24. 60
Wm. C. Codd . . . . .	27. 25

## Class 3, belting, etc.:

Wm. A. Wheeler . . . . .	747. 85
Manhattan Supply Co . . .	576. 20
E. B. Preston & Co . . . . .	611. 94
Graton & Knight Manu- facturing Co. * . . . .	436. 85
Chas. A. Schierer & Co . .	615. 10
Loeb Bros . . . . .	526. 70
S. C. Forsaith Machine Co .	472. 02
Stevenson Bros. & Co . . .	813. 70
Dwight F. Walker . . . . .	827. 34
Page Belting Co . . . . .	465. 15
Morton Reed & Co . . . . .	485. 67
Melville Lindsay . . . . .	461. 75
Charles H. Pleasants . . .	443. 35
J. R. Stine & Co . . . . .	588. 95
Donegan & Swift . . . . .	618. 85
Wm. C. Codd . . . . .	607. 70

## Class 4, shafting, etc.:

Geo. V. Cresson . . . . .	812. 78
S. C. Forsaith Machine Co .	878. 14
Clarence F. McMurray * .	726. 42
Wm. Sellers & Co . . . . .	781. 31
Donegan & Swift . . . . .	843. 86
Wm. C. Codd . . . . .	891. 76

## Class 5, pulleys:

Thompson C. Gill & Co . .	787. 30
Geo. V. Cresson . . . . .	680. 51
S. C. Forsaith Machine Co .	721. 15
Clarence F. McMurray * .	518. 05
Wm. Sellers & Co . . . . .	596. 17
Donegan & Swift . . . . .	629. 15
Wm. C. Codd . . . . .	776. 46

\*Accepted.

## Class 6, belt tightener, etc.;

George V. Cresson . . . . .	\$81. 20
Charles J. Field . . . . .	91. 85
S. C. Forsaith Machine Co. * . . . .	77. 00
Whetstone & Co . . . . .	102. 50
Donegan & Swift . . . . .	179. 50

## Class 7, pumps, etc.:

Geo. V. Cresson . . . . .	120. 00
Charles J. Field . . . . .	123. 50
S. C. Forsaith Machine Co. * . . . .	109. 00
Morton, Reed & Co . . . .	120. 00
Donegan & Swift . . . . .	120. 00
Wm. C. Codd . . . . .	130. 00

## Class 8, iron:

Thompson C. Gill & Co . .	49. 00
Chas. J. Field * . . . . .	44. 00
S. C. Forsaith Machine Co .	62. 50
Whetstone & Co . . . . .	160. 00
Agnila Rich . . . . .	57. 20
Charles H. Pleasants . . .	69. 80
Donegan & Swift . . . . .	60. 00
Wm. C. Codd . . . . .	131. 75

## Class 9, hose, etc.:

William A. Wheeler . . . .	93. 75
Charles J. Field * . . . .	69. 38
S. C. Forsaith Machine Co .	100. 25
Page Belting Co . . . . .	72. 25
Agnila Rich . . . . .	80. 87
J. B. Monell & Co . . . . .	97. 50

## Class 10, felting:

William A. Wheeler . . . .	129. 75
Manhattan Supply Co . . .	130. 50
Charles J. Field . . . . .	111. 75
Ford & Kendig Co . . . . .	116. 25
S. C. Forsaith Machine Co . . . . .	126. 00
Stevenson Bros. & Co . . .	150. 00
Agnila Rich * † . . . . .	111. 75

†Decided by lot.

*Proposals for naval supplies for the League Island navy-yard, etc.—Continued.*

## Class 10—Continued.

Charles H. Pleasants .....	\$114.00
Donegan & Swift .....	117.75
J. B. Monell & Co .....	180.00
Wm. C. Codd .....	123.00

## Class 11, pipe etc.:

Wm. A. Wheeler .....	1,202.04
Charles J. Field .....	1,050.81
Ford & Kending Co * .....	970.70
S. C. Forsaith Machine Co .....	1,066.25

## Class 11—Continued.

Brines, Chase & Co .....	\$1,018.02
Hunter & Dickson .....	999.45
Whetstone & Co .....	1,427.84
Donegan & Swift .....	1,009.03
Wm. C. Codd .....	1,163.32

## Class 12, 1 heater:

Charles J. Field * .....	280.00
Kensington Engine Works (limited) .....	285.00

*Proposals for boilers, etc., for the navy-yard, Boston, Mass., under Bureau advertisement dated November 5, 1891; opened November 24, 1891.*

## Class 1, plow steel, rope guys:

Manhattan Supply Co * ..	\$693.00
Edward Kendall & Sons ..	775.88
Charles H. Pleasants .....	698.20
S. C. Forsaith Machine Co .....	779.00
Thompson C. Gill & Co ..	798.00

## Class 2, 3, boilers:

Southwork Foundry and Machine Co .....	5,109.00
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## Class 2, 3—Continued.

Edward Kendall & Sons ..	\$1,392.39
Atlantic Works .....	4,191.00
S. C. Forsaith Machine Co * .....	3,261.99
Phoenix Iron Co .....	5,085.00
Robert J. Gray .....	4,671.00

*Proposals for steel material for the Monadnock, naval supplies, etc., Mare Island, California, under Bureau advertisement dated October 21, 1891; opened November 24, 1891.*

## Class 1, shafting:

Samuel J. Hendy .....	\$1,039.60
S. C. Forsaith Machine Co .....	1,009.10
Charles H. Pleasants .....	1,135.56
Miller, Sloss & Scott .....	1,494.00
Risdon Iron and Locomo- tive Works * .....	986.50

## Class 2, rivets:

Charles H. Pleasants * ..	18.00
Miller, Sloss & Scott .....	22.50

## Class 3, farnought, etc.:

Charles H. Pleasants * ..	89.55
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## Class 4, hardware, etc.:

Charles H. Pleasants * ..	18.57
Miller, Sloss & Scott .....	22.60

## Class 5, lumber:

A. S. Carmen .....	2,750.00
Wm. Walker * .....	2,094.00
F. W. Kreling & Sons .....	2,106.50
A. Powell .....	2,547.50
J. F. Kennedy .....	2,930.00

## Class 6, lead, etc.:

Charles H. Pleasants .....	78.06
Miller, Sloss & Scott .....	80.00
Aquila Rich * .....	75.80

## Class 7, steel, machinery:

Midvale Steel Co .....	20.28
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## Class 7—Continued.

Chas. H. Pleasants * .....	\$17.30
Miller, Sloss & Scott .....	18.00
Aquila Rich .....	19.25

## Class 8, potash:

Charles H. Pleasants * ...	4.00
Aquila Rich .....	4.75

## Class 9, oars:

William Walker .....	235.20
Charles H. Pleasants .....	198.00
Aquila Rich .....	207.90
James W. Soper * .....	184.70
A. Powell .....	252.80

## Class 10, steel plates:

Miller, Sloss & Scott .....	7,659.12
Carnegie, Phipps & Co. (limited) .....	9,080.40
Risdon Iron and Locomo- tive Works .....	7,698.60

## Class 11, shapes:

Carnegie, Phipps & Co. (limited) .....	2,704.80
Risdon Iron and Locomo- tive Works * .....	2,352.00

## Class 12, rivets:

S. C. Forsaith Machine Co .....	1,840.70
J. H. Sternbergh & Son * ..	1,747.50

*Proposals for plate steel for the Norfolk yard, under Bureau advertisement dated November 19, 1891; opened December 8, 1891.*

## Class 1, steel plates:

S. C. Forsaith Machine Co ..	\$2,620.80
Carnegie, Phipps & Co * ..	2,072.00
George L. Neville .....	4,200.00

## Class 2, electrical supplies:

George L. Neville * .....	45.00
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## Class 3, electrical supplies:

George L. Neville * .....	\$45.50
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## Class 4, electrical supplies:

George L. Neville * .....	305.90
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*Proposals for coal and steel plates for the New York navy-yard, under Bureau advertisement dated November 18, 1891; opened December 8, 1891.*

## Class 1, 5,000 tons coal:

Aquila Rich { bid A ....	\$14,625.00
{ bid B ....	15,700.00
{ bid C ....	16,875.00
Sam'l G. French { bid A ....	16,600.00
{ bid B ....	14,850.00
David Duncan & Son...	14,450.00
West Virginia Coal Co..	16,900.00
Peale, Peacock & Kerr..	14,700.00

## Class 1—Continued:

Burwind White Coal Mining Co. *	\$16,250.00
Barber & Ziegler { bid A ..	17,100.00
{ bid B ..	14,750.00

## Class 2, steel plates:

A. R. Whitney*	3,486.94
S. C. Forsaith Machine Co	4,662.54
Carnegie, Phipps & Co ..	3,676.20

*Proposals for steel plates, etc., for the navy-yard, Washington, D. C., under Bureau advertisement, November 24, 1891; opened December 15, 1891.*

## Class 1, chrome steel plates:

Midvale Steel Co .....	\$1,400.00
Park Brother & Co.* .....	1,006.25

## Class 2, steel forgings:

Carpenter Steel Co.* .....	504.00
Midvale Steel Co .....	1,176.00

## Class 3, tool steel:

Benj. Atha & Illingworth Co .....	1,297.00
Brown & Co.* .....	1,065.50
Manhattan Supply Co .....	1,527.57
Carpenter Steel Co .....	1,898.00
Midvale Steel Co .....	1,390.00
J. B. Kendall .....	1,098.10
Parkhurst & Wilkinson .....	1,466.74
Park Brother & Co., Limited† .....	1,529.68
Crescent Steel Co .....	2,086.00
Sterling Steel Co .....	2,224.00
James B. Lambie .....	1,494.25

## Class 4, wire rope:

Harry L. Briggs .....	238.80
Charles H. Pleasants .....	260.00
Charles T. Carter & Co..	248.00
Wm. A. Pate* .....	237.40
S. C. Forsaith Machine Co.	252.00
Manhattan Supply Co .....	259.00
J. B. Morrell & Co .....	276.00
Trenton Iron Co .....	246.80
Thompson C. Gill & Co..	299.00
Aquila Rich .....	247.60

## Class 4, wire rope—Continued:

Geo. H. Carey .....	\$240.00
James B. Lambie .....	300.00

## Class 6, wire rope:

Charles H. Pleasants .....	279.00
Charles T. Carter & Co..	270.00
Wm. A. Pate .....	264.60
S. C. Forsaith Machine Co.	270.00
Manhattan Supply Co .....	294.57
J. B. Morrell & Co .....	274.50
Trenton Iron Co .....	264.60
Thompson C. Gill & Co..	288.00
Aquila Rich .....	267.75
George H. Carey* .....	256.50
James B. Lambie .....	315.00

## Class 7, brass screws:

Harry L. Briggs .....	611.30
Charles H. Pleasants .....	639.35
Chas. T. Carter & Co.* ..	606.70
J. H. Chesley & Co .....	632.64
McFadden & Co .....	624.62
Wm. A. Pate .....	717.40
Manhattan Supply Co .....	661.20
George H. Carey .....	614.14
James B. Lambie .....	648.70

## Class 8, valves:†

Donegan & Swift .....	1,280.50
Chapman Valve Manufacturing Co.† .....	4,866.01
S. C. Forsaith Machine Co.	1,380.58
Wm. C. Codd .....	1,438.80

*Proposals for provisions for the navy-yard, Mare Island, California, under Bureau advertisement dated November 21, 1891; opened December 15, 1891.*

## Class 1, 25,500 pounds flour:

William Haas * .....	\$828.75
Lewis T. Snow .....	867.00
Samuel I. Wormser .....	889.95

## Class 2, beans (1,350 gallons):

Wm. Haas .....	351.00
Samuel I. Wormser* .....	324.00
Herman Levi .....	326.43
Coghill & Kohn .....	344.25
Thomas H. Dowling .....	343.30

## Class 3, 11,000 pounds rice:

Wm. Haas .....	591.25
Lewis T. Snow .....	687.50
Samuel I. Wormser .....	603.35
Herman Levi* .....	585.75
Coghill & Kohn .....	594.00
Thomas H. Dowling .....	618.50

## Class 4, 1,000 pounds apples:

William Haas * .....	\$72.50
Lewis T. Snow .....	110.00
Samuel I. Wormser .....	88.50
Herman Levi .....	84.00
Coghill & Kohn .....	75.00
Thomas H. Dowling .....	78.00

## Class 5, 1,000 pounds peaches:

Wm. Haas*§ .....	65.00
Lewis T. Snow .....	90.00
Samuel I. Wormser .....	89.00
Herman Levi .....	74.00
Coghill & Kohn§ .....	66.00
Thos. H. Dowling .....	75.50

## Class 6, 3,200 pounds salmon:

William Haas .....	304.00
Lewis T. Snow .....	416.00
Samuel I. Wormser .....	303.36

\*Accepted.

† Informal.

‡ No award.

§ Decided by lot.



*Proposals for provisions for the navy-yard, Mare Island, California, etc.—Continued.*

## Class 6—Continued.

Herman Levi*.....	\$291.20
Coghill & Kohn.....	308.00

## Class 7, 3,235 pounds tea:

Siegfried & Brandenstein.....	921.97
William Haas.....	1,213.12
Samuel I. Wormser.....	1,047.33
Wellman, Peck & Co.....	1,051.38
Herman Levi.....	1,358.70
Thomas H. Dowling*.....	873.45

## Class 8, 31,000 pounds sugar:

William Haas*.....	1,658.50
Lewis T. Snow.....	1,701.90

## Class 8—Continued.

Samuel I. Wormser.....	\$1,720.50
Herman Levi.....	1,666.25
Coghill & Kohn.....	1,689.50
Thomas H. Dowling.....	1,689.50

## Class 9, 850 gallons sirup:

William Haas*.....	229.50
Samuel I. Wormser.....	231.62

## Class 10, 700 gallons vinegar:

William Haas.....	126.00
Samuel I. Wormser.....	86.62
Thomas H. Dowling.....	87.50

*Proposals for provisions, clothing, etc., for the New York navy-yard, under Bureau advertisement dated November 23, 1891; opened December 15, 1891.*

## Class 1, 5,000 feet leading hose:

Thompson C. Gill & Co.....	\$4,450.00
Harry L. Briggs.....	3,720.00
New York Belting & Packing Co.....	4,500.00
Manhattan Supply Co.....	3,950.00
Gutta Percha and Rubber Manufacturing Co.....	5,000.00
Revere Rubber Co.....	4,375.00
Wm. A. Wheeler.....	3,798.85
Hans Hernken.....	3,837.50
J. B. Morrell & Co.....	4,950.00
Aquila Rich*.....	3,599.50

## Class 2, 1,000 pounds corn meal:

Francis H. Leggett & Co.*†	33.70
J. B. Morrell & Co.....	35.20
Chas. E. Ahrens.....	35.00
Thomas W. Ormiston†.....	33.70

## Class 3, 1,000 pounds oat meal:

Francis H. Leggett & Co.....	44.90
J. B. Morrell & Co.....	42.10
Charles E. Ahrens†.....	38.70
Thomas W. Ormiston*†.....	38.70

## Class 4, 1,000 pounds hominy:†

Francis H. Leggett & Co.....	36.50
J. B. Morrell & Co.....	37.70
Chas. E. Ahrens.....	34.50
Thomas W. Ormiston.....	33.50

## Class 5, 37,500 barrels, 12,500 one-half barrels flour:

Rowland & Co.....	1,350.00
Sharp & Perkins.....	1,400.00
Francis H. Leggett & Co.....	1,337.50
Charles E. Ahrens*.....	1,293.75

## Class 6, 52,500 barrels, 40,500 one-half barrels salt pork:

Francis H. Leggett & Co.....	6,479.25
Charles F. Mattlage.....	6,331.05
H. Powdermaker.....	6,965.25
Figge & Bro.*.....	6,313.65

## Class 7, 5,000 gallons beans:†

Sharp & Perkins.....	1,462.50
Manhattan Supply Co.....	1,473.50
Francis H. Leggett & Co.....	1,462.50
Chas. F. Mattlage.....	1,393.75
Kemp, Day & Co.....	1,462.50
Hans Hernken.....	1,720.00
Chas. E. Ahrens.....	1,372.50
Thomas W. Ormiston.....	1,355.00

## Class 8, 4,100 gallons peas:†

Sharp & Perkins.....	973.75
Manhattan Supply Co.....	896.67
Francis H. Leggett & Co.....	912.25
Kemp, Day & Co.....	871.25
Charles E. Ahrens.....	902.00
Thomas W. Ormiston.....	763.63

## Class 9, 37,500 barrels, 24,700 half barrels, salt beef:

Charles F. Mattlage*§.....	3,384.33
J. B. Merrell & Co.....	3,700.00
H. Powdermaker.....	3,594.17

## Class 10, 15,000 pounds rice:†

Sharp & Perkins.....	881.25
Francis H. Leggett & Co.....	913.50
Gustave A. Jahn.....	825.00
Chas. E. Ahrens.....	900.00
Thomas W. Ormiston.....	{ 993.75 806.25

## Class 11, 3,000 pounds raisins:†

Sharp & Perkins.....	258.75
Francis H. Leggett & Co.....	225.00
Kemp, Day & Co.....	240.00
Chas. E. Ahrens.....	208.50
Thomas W. Ormiston.....	{ 243.00 198.00

## Class 12, 3,000 pounds prunes:

Francis H. Leggett & Co.....	367.50
Kemp, Day & Co.....	375.00
Chas. E. Ahrens.....	367.50
Thos. W. Ormiston.....	389.10

## Class 13, 16,300 pounds butter:

Simpson, McIntire & Co.*§	5,542.00
Chas. E. Ahrens.....	5,460.50

## Class 14, 31,000 pounds canned roast beef:

Armour & Co.....	2,286.25
Francis H. Leggett & Co.*	1,850.70
Chas. F. Mattlage.....	2,082.30
Kemp, Day & Co.....	1,937.50
H. M. Anthony.....	2,066.67
Chas. E. Ahrens.....	1,860.00
H. Powdermaker.....	1,931.30

## Class 15, 28,000 pounds canned roast mutton:

Francis H. Leggett & Co.*§	2,643.20
Kemp, Day & Co.....	3,010.00

## Class 16, 25,000 pounds canned corned beef:

Armour & Co.....	1,000.00
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\* Accepted. † Decided by lot.  
‡ Award for 5,000 pounds butter.

§ No award. ¶ Award made for \$1,000.  
‡ Award for 20,000 pounds roast mutton.

*Proposals for provisions, clothing, etc., for the New York navy-yard, etc.—Continued.*

## Class 16—Continued.

Francis H. Leggett & Co*	\$1,607.50
Charles F. Mattlage .....	1,952.50
H. M. Anthony .....	1,666.67
H. Powdermaker .....	{ 1,922.50
	{ 1,720.00

## Class 17, 8,000 pounds brawn:

Armour & Co .....	590.00
Francis H. Leggett & Co.	700.00
Chas. F. Mattlage .....	620.00
H. M. Anthony .....	800.00
Chas. E. Ahrens * .....	544.00
H. Powdermaker .....	615.00

## Class 18, 36,000 pounds ham:

Armour & Co .....	5,220.00
Francis H. Leggett & Co.	4,395.60
H. M. Anthony* † .....	4,387.50

## Class 19, 10,000 pounds bacon:

Sharp and Perkins* † .....	900.00
Charles F. Mattlage .....	947.00
Kemp, Day & Co .....	975.00
H. Powdermaker .....	1,100.00

## Class 20, 10,000 pounds sausage:

Armour & Co.* ‡ .....	900.00
Francis H. Leggett & Co.	963.00
Kemp, Day & Co .....	1,187.50
H. M. Anthony .....	1,041.67

## Class 21, 8,000 pounds fish: ||

Chas. F. Mattlage .....	778.40
Kemp, Day & Co .....	792.00
Chas. E. Ahrens .....	790.40

## Class 22, 2,000 pounds tea: ||

Sharp & Perkins .....	770.00
Manhattan Supply Co. ....	599.00
Francis H. Leggett & Co.:	
Bid A .....	820.00
Bid B .....	680.00
Bid C .....	470.00
Kemp, Day & Co .....	870.00
Chas. E. Ahrens .....	900.00
	{ 710.00
Thos. W. Ormiston .....	{ 530.00
	{ 600.00

## Class 23, 67,500 barrels, 22,500 barrels sugar:

Sharp & Perkins .....	3,825.00
Manhattan Supply Co. ....	3,811.50
Francis H. Leggett & Co.* ‡	3,701.25
Chas. E. Ahrens .....	3,879.00
Thomas W. Ormiston .....	3,978.00

## Class 24, 31,500 pounds pickles:

J. B. Truesdell .....	2,008.12
Kemp, Day & Co .....	2,142.00
F. Frohrenbach & Co.* **	1,858.50

## Class 25, 2,500 gallons sirup: ||

Sharp & Perkins .....	650.00
Francis H. Leggett & Co.	825.00
Gustave A. Jahn .....	500.00
Chas. E. Ahrens .....	575.00
Thomas W. Ormiston .....	553.13

## Class 26, 2,500 gallons vinegar:

F. Frohrenbach & Co.* ..	322.50
Chas. E. Ahrens .....	335.00
Thomas W. Ormiston .....	335.00

\* Accepted.

† Award made for 15,000 pounds ham.

‡ Award for 2,500 pounds bacon.

§ Award for 7,000 pounds sausage.

## Class 27, 59,500 pounds canned vegetables:

J. B. Truesdell .....	\$5,075.50
Francis H. Leggett & Co.	3,504.55
Kemp, Day & Co .....	3,498.60
Chas. E. Ahrens .....	4,165.00
Thos. W. Ormiston* .....	3,254.65

## Class 28, 5,700 pounds tomatoes: ||

Sharp & Perkins .....	220.87
Francis H. Leggett & Co.	192.09
Kemp, Day & Co .....	190.00
Charles E. Ahrens .....	193.23
Thomas W. Ormiston .....	198.36

## Class 29, 1,000 scrub brushes:

C. H. & E. S. Goldberg* ..	150.00
Harry L. Briggs .....	217.50
Tissot & Schultz .....	198.00
Manhattan Supply Co. ....	229.70
Cavanaugh & Thompson ..	179.90
J. B. Morrell & Co .....	270.00
Ansel W. Paine .....	1,000.00
Joseph Wechsler .....	178.50

## Class 30, 3,000 blacking brushes:

C. H. & E. S. Goldberg* ..	570.00
Harry L. Briggs .....	627.00
Tissot & Schultz .....	657.00
Manhattan Supply Co. ....	620.10
Cavanaugh & Thompson ..	629.40
J. B. Morrell & Co .....	742.50
Ansel W. Paine .....	1,000.00
Joseph Wechsler .....	630.00

## Class 31, 2,500 wisp brooms:

C. H. & E. S. Goldberg ..	350.00
Harry L. Briggs .....	385.00
Tissot & Schultz .....	406.25
Manhattan Supply Co. ....	411.75
Cavanaugh & Thompson* ..	349.50
J. B. Morrell & Co .....	400.00
Ansel W. Paine .....	350.00
Joseph Wechsler .....	500.00

## Class 32, 5,000 yards bleached duck:

S. C. Forsaith Machine Co.	595.00
Tissot & Schultz .....	624.00
Manhattan Supply Co. ....	629.50
J. B. Morrell & Co .....	618.75
S. Allen Evans .....	662.50
Aquila Rich* .....	579.50
Joseph Wechsler .....	630.00

## Class 33, 5,000 yards unbleached duck:

S. C. Forsaith Machine Co.	480.00
Tissot & Schultz* .....	479.50
Manhattan Supply Co. ....	483.50
J. B. Morrell & Co .....	487.00
S. Allen Evans .....	480.50
Aquila Rich .....	486.00
Joseph Wechsler .....	500.00

## Class 34, 5,000 watch caps:

Horstmann Bros. & Co. *	2,025.00
Manhattan Supply Co. ....	2,274.50
B. Z. Pipey & Co .....	2,250.00
Samuel Baron .....	2,122.50
Joseph Wechsler .....	2,123.00

|| No award.

\* Award made for 50,000 pounds sugar.

\*\* Award made for 20,000 pounds pickles.

*Proposals for provisions, clothing, etc., for the New York navy-yard, etc.—Continued.*

<b>Class 35, 1,000 mattresses:</b>		<b>Class 43, 500 mess kettles:</b>	
Tissot & Schultz	\$3,100.00	Francis T. Witte Hard-ware Co	\$265.00
Manhattan Supply Co.	3,250.00	Manhattan Supply Co.	263.50
B. Z. Pippey & Co.	3,200.00	Newark Sheet Metal Ware Co	275.00
J. W. W. Moyer	3,080.00	Wm. A. Wheeler	285.00
Hans Hemken	3,430.00	Cavanaugh & Thompson*	240.00
Wm. F. Bernstein*	2,947.40	Hans Hemken	324.70
Thos. M. Farley	3,000.00	J. B. Morrell & Co	240.00
Joseph Wechsler	3,139.50	<b>Class 45, 3,000 jack knives, per M:</b>	
<b>Class 36, 1,000 blankets:</b>		Harry L. Briggs	1,195.50
B. Z. Pippey & Co.*	2,290.00	Tissot & Schultz	1,330.00
S. Allen Evans	2,340.00	Manhattan Supply Co*	1,137.00
Joseph Wechsler	2,600.00	Ansel W. Paine	1,230.40
<b>Class 37, 6,000 yards trousers loth:</b>		<b>Class 46, 100,000 pounds salt water soap):</b>	
Sullivan, Vail & Co.	13,315.80	Manhattan Supply Co*	4,049.00
Wendell, Fay & Co.	13,427.40	Chas. McKeone's Sons	4,270.00
B. Z. Pippey & Co	13,320.00	<b>Class 47, 2,000 coarse combs:</b>	
<b>Class 38, 25,000 pieces white linen tape:</b>		Tissot & Schultz*	94.00
Tissot & Schultz	372.50	Hans Hemken	134.80
Manhattan Supply Co	370.00	Ansel W. Paine	200.00
Wm. A. Wheeler	342.50	Joseph Wechsler	95.00
Hans Hemken	332.50	<b>Class 48, 5,000 boxes black-ing:</b>	
<b>Class 39, 5,000 spools spool cotton:</b>		Harry L. Briggs*	144.00
Tissot & Schultz	172.00	Manhattan Supply Co	148.50
Wm. A. Wheeler	189.50	Hans Hemken	198.50
William Wilson*	159.37	Ansel W. Paine	200.00
Hans Hemken	184.50	<b>Class 49, 25,000 pounds candles:</b>	
Joseph Wechsler	166.66	Sharp & Perkins	3,281.25
<b>Class 40, 15,000 spools sewing silk:</b>		R. G. Mitchell	2,750.00
Tissot & Schultz*	448.50	William & Hay Walker	2,435.00
Wm. A. Wheeler	568.50	Manhattan Oil Co*	2,370.00
Hans Hemken	499.50	Warner Ells	2,406.25
Joseph Wechsler	450.00	<b>Class 50, 3,000 tins for ground coffee:</b>	
<b>Class 41, 6,000 dozen ivory buttons (small):</b>		M. Beggs*	952.50
Tissot & Schultz	349.80	Francis T. Witte Hard-ware Co	990.00
Manhattan Supply Co.	354.00	Manhattan Supply Co.	966.90
Thos. G. Hood*	234.60	Newark Sheet Metal Ware Co	1,350.00
Wm. A. Wheeler	375.00	Hans Hemken	1,020.00
Hans Hemken	274.80	J. B. Morrell & Co.	958.20
Joseph Wechsler	360.00	<b>Class 51.</b>	
<b>Class 42, 6,000 dozen rubber buttons, small:</b>		Harry L. Briggs	626.00
Tissot & Schultz*	220.80	Francis T. Witte Hard-ware Co	706.74
Manhattan Supply Co.	234.00	Manhattan Supply Co*	536.51
Thos. G. Hood	224.40	J. B. Morrell & Co	570.00
Wm. A. Wheeler	255.00	<b>Class 52:</b>	
Hans Hemken	223.80	B. Y. Pippey & Co	5,000.00
Joseph Wechsler	240.00	S. Allen Evans*	4,175.00

*Proposals for power capstans, etc., for the Norfolk navy-yard, under Bureau advertisement dated December 2, 1891; opened December 22, 1891.*

<b>Class 1, 2 power capstans:</b>		<b>Class 2—Continued.</b>	
American Ship Windlass Co	\$1,052.00	Chas. M. Childs & Co...	\$276.00
Joseph P. Manton*	748.00	<b>Class 6, brick, etc:</b>	
<b>Class 2, metallic paint:</b>		Niemeyer & Bridgers	374.00
Niemeyer & Bridgers	262.50	Geo. L. Neville	562.00
George L. Neville*	239.70	E. C. Brooks & Co.*	373.20
Aquila Rich	261.00	Murdaugh & Mayo	561.50

\*Accepted.

*Proposals for machine tools for the League Island navy-yard, under Bureau advertisement dated December 3, 1891; opened December 22, 1891.*

<b>Class 1, tenoning machine:</b>		<b>Class 6—Continued.</b>	
Smith Courtney Co.*.....	\$148.00	S. A. Woods Machine Co.	\$250.00
Egan Co.....	250.00	Dwight F. Walker.....	250.00
S. A. Woods Machine Co.	175.00	Berry & Orton Co.....	138.00
Dwight F. Walker.....	300.00	Goodell & Waters.....	130.00
Berry & Orton Co.....	216.00	James W. Soper.....	268.00
S. C. Forsaith Machine Co.	218.00	S. C. Forsaith Machine Co.*.....	114.00
Morton, Reed & Co.....	150.00	Morton, Reed & Co.....	120.00
<b>Class 2, mortising and boring machine:</b>		<b>Class 7, hand feed and jointing machine:</b>	
Smith Courtney Co.*.....	132.00	Smith Courtney Co.....	135.00
Egan Co.....	275.00	Egan Co.....	175.00
Dwight F. Walker.....	300.00	S. A. Woods Machine Co.	150.00
Berry & Orton Co.....	270.00	Dwight F. Walker.....	193.00
S. C. Forsaith Machine Co.	287.00	Berry & Orton Co.*.....	129.00
Morton, Reed & Co.....	185.00	Goodell & Waters.....	145.00
<b>Class 3, scroll sawing machine:</b>		Morton, Reed & Co.†.....	120.00
Smith Courtney Co.....	88.00	<b>Class 8, planer:</b>	
Egan Co.....	115.00	S. A. Woods Machine Co.	1,400.00
S. A. Woods Machine Co.	125.00	Dwight F. Walker.....	760.00
Dwight F. Walker.....	100.00	Putnam Machine Co.....	1,375.00
Berry & Orton Co.*.....	80.00	Goodell & Waters*.....	750.00
Goodell & Waters.....	100.00	Morton, Reed & Co.†.....	488.00
S. C. Forsaith Machine Co.	84.34	<b>Class 9, grindstone:</b>	
Morton, Reed & Co.....	87.00	Smith Courtney Co.....	56.00
<b>Class 4, resawing machine:</b>		Egan Co.....	60.00
Egan Co.....	725.00	Berry & Orton Co.....	92.00
Dwight F. Walker*.....	500.00	Goodell & Waters.....	200.00
Berry & Orton Co.....	540.00	James W. Soper.....	41.00
Morton, Reed & Co.†.....	450.00	S. C. Forsaith Machine Co.*†.....	41.00
<b>Class 5, carving machine:</b>		Thompson C. Gill & Co.....	64.00
Smith Courtney Co.*.....	328.00	Morton, Reed & Co.....	60.00
S. A. Woods Machine Co.	350.00	<b>Class 10, paints:</b>	
Dwight F. Walker.....	700.00	M. W. Phillips.....	73.61
Berry & Orton Co.....	523.00	Chas. M. Childs & Co.*.....	54.65
S. C. Forsaith Machine Co.	367.50	Aquila Rich.....	58.07
Morton, Reed & Co.....	460.00	Harrison Bros & Co.....	61.02
<b>Class 6, automatic knife-grinder:</b>		Roller & Shoemaker.....	57.50
Smith Courtney & Co....	275.00		

*Proposals for building material, etc., for the Mare Island navy-yard, under Bureau advertisement dated December 4, 1891; opened December 29, 1891.*

<b>Class 1, winch engine:</b>		<b>Class 6—Continued.</b>	
S. C. Forsaith Machine Co.*.....	\$890.00	S. C. Forsaith Machine Co.	\$1,705.00
Williamson Bros.....	994.00	Miller, Sloss & Scott.....	1,426.20
<b>Class 2, bolts, etc.:</b>		N. & G. Taylor Co.*.....	1,232.15
Charles H. Pleasants.....	229.90	Wm. Walker.....	1,772.70
Miller, Sloss & Scott*.....	225.78	Thompson C. Gill & Co.....	1,342.56
<b>Class 3, slate:</b>		<b>Class 7, metallic paint, etc.:</b>	
Abraham Powell†.....	1,250.00	Charles H. Pleasants.....	1,017.00
<b>Class 4, charcoal:</b>		Charles M. Yates.....	798.37
Chas. H. Pleasants.....	164.50	Aquila Rich.....	719.20
Abraham Powell.....	63.00	Wm. Walker.....	806.06
Miller, Sloss & Scott.....	59.50	F. N. Woods*.....	716.35
William Walker*.....	49.35	Chas. M. Childs & Co.....	934.50
<b>Class 5, Oregon pine:</b>		<b>Class 8, wire screen cloth:</b>	
Abraham Powell.....	37.44	Charles H. Pleasants.....	642.96
Wm. Walker*.....	36.19	S. C. Forsaith Machine Co.	576.97
<b>Class 6, roofing tin:</b>		Miller, Sloss & Scott*.....	394.17
Chas. H. Pleasants.....	1,966.40	Wm. Walker.....	365.32
*Accepted.	† Informal.	Thompson C. Gill & Co.....	872.07
		† No award; bid excessive.	

*Proposals for naval supplies for the New York navy-yard, under Bureau advertisement dated December 17, 1891; opened January 5, 1892.*

Class 1, twills, etc.:		Class 12, paints:	
Hans Hemken.....	\$331.50	Fiske Bros.....	\$501.22
Wm. A. Wheeler.....	375.00	J. B. Morrell & Co.....	482.64
G. B. Merrill.....	323.50	Charles H. Pleasants.....	470.07
Manhattan Supply Co.*.....	314.50	Wm. McDonagh & Co.....	484.03
Tissot & Schultz.....	330.00	Chas. E. Ring.....	491.64
Class 2, sewing cotton:		Aquila Rich*.....	449.65
William Wilson*.....	382.50	Chas. M. Childs & Co.....	459.63
Hans Hemken.....	393.00	Class 13, cement:	
Wm. A. Wheeler.....	410.00	Hans Hemken.....	134.26
Joseph Wechsler.....	400.00	Niemeyer & Bridgers.....	139.65
G. B. Merrill.....	423.00	J. B. Morrell & Co.....	142.10
Manhattan Supply Co.....	423.00	Geo. H. Carey.....	134.26
Tissot & Schultz.....	450.00	Geo. L. Neville.....	171.50
Class 3, basting cotton:		Chas. H. Pleasants.....	133.28
Hans Hemken*.....	15.00	Wm. McDonagh & Co.....	147.00
Wm. A. Wheeler.....	27.00	Manhattan Supply Co.....	134.26
Joseph Wechsler.....	25.00	Morris Ebert*.....	131.81
G. B. Merrill.....	19.00	Class 14, pipe:	
Manhattan Supply Co.....	17.00	Colwell Lead Co.....	79.38
Tissot & Schultz.....	18.00	Geo. L. Neville.....	109.58
Class 4, linen thread:		Charles H. Pleasants.....	82.77
Hans Hemken*.....	11.00	Manhattan Supply Co.*.....	67.60
Joseph Wechsler.....	30.00	Geo. Cooper Dennis.....	90.66
Tissot & Schultz.....	23.90	S. C. Forsaith Machine Co.....	91.50
Class 5, silk laces:		Chas. E. Ring.....	102.79
Hans Hemken*.....	117.90	Class 15, zinc:	
Joseph Wechsler.....	300.00	Colwell Lead Co.....	258.17
Tissot & Schultz.....	162.00	Geo. L. Neville.....	246.11
Class 6, sewing silk:		Chas. H. Pleasants.....	235.96
Hans Hemken.....	450.00	Manhattan Supply Co.....	243.16
Wm. A. Wheeler.....	387.50	S. C. Forsaith Machine Co.....	242.91
Joseph Wechsler.....	385.00	Geo. Cooper Dennis*.....	224.03
G. B. Merrill.....	375.00	Aquila Rich.....	235.30
Tissot & Schultz.....	411.50	Class 16, hardware:	
Class 7, buttons, etc., bone:		Harry L. Briggs.....	29.57
Hans Hemken.....	68.40	J. B. Morrell & Co.....	36.08
Wm. A. Wheeler.....	72.00	Geo. H. Carey.....	32.59
Joseph Wechsler.....	63.00	Geo. L. Neville.....	67.00
Manhattan Supply Co.....	69.60	Charles H. Pleasants.....	24.09
Tissot & Schultz.....	58.80	Manhattan Supply Co.....	24.42
G. B. Merrill.....		S. C. Forsaith Machine Co.....	33.98
Class 8, buttons, ivory:		McFadden & Co.....	23.43
Hans Hemken.....	120.00	Tissot & Schultz.....	31.85
Wm. A. Wheeler.....	140.00	Chas. E. Ring*.....	21.72
Joseph Wechsler.....	120.00	Aquila Rich.....	24.63
G. B. Merrill.....	120.00	Class 17, lumber:	
Tissot & Schultz*.....	78.00	Joseph W. Duryee.....	82.50
Jas. H. Ruggles.....	81.67	Watson & Pittinger.....	85.50
Class 9, flax tape, etc.:		Chas. E. Pell*.....	68.83
Hans Hemken*.....	343.74	Class 18, coir brushes:	
Wm. A. Wheeler.....	386.59	Harry L. Briggs*.....	189.00
G. B. Merrill.....	433.00	Niemeyer & Bridges.....	233.40
Ansel W. Paine.....		J. B. Morrell & Co.....	240.00
Tissot & Schultz.....	376.00	Geo. H. Carey.....	234.00
Class 10, iron:		Geo. W. Neville.....	228.00
Geo. H. Carey.....	156.96	Ansel W. Paine.....	250.00
Geo. L. Neville.....	247.80	Manhattan Supply Co.....	197.40
J. H. Sternbergh & Son.....	133.91	Class 19, lumber:†	
Wm. A. Wheeler.....	185.85	Joseph W. Duryee.....	5,696.00
Manhattan Supply Co.....	199.43	Geo. L. Neville.....	4,890.55
Chas. E. King*.....	123.60	Watson & Pittinger.....	2,149.35
Class 11, alcohol:		Class 20, copper burrs and rivets:	
Chas. H. Pleasants.....	123.30	Harry L. Briggs.....	138.88
Aquila Rich*.....	147.50	Geo. H. Carey.....	399.95

\*Accepted.

† Informal.

*Proposals for naval supplies for the New York navy-yard, etc.—Continued.***Class 20—Continued.**

Charles H. Pleasants .....	\$146.44
Ansel W. Paine .....	153.07
Manhattan Supply Co.* .....	116.38
Tissot & Schultz .....	235.30
Chas. E. Ring .....	158.90
Aquila Rich .....	158.44

**Class 21, screws, etc.:**

Harry L. Briggs .....	488.07
J. B. Morrell & Co. ....	499.28
Geo. H. Carey .....	476.48
Chas. H. Pleasants .....	478.88
Ansel W. Paine .....	643.97
Manhattan Supply Co.* .....	468.27
Tissot & Schultz .....	526.60
Chas. E. Ring .....	493.13
Aquila Rich .....	473.88

**Class 22, leather:**

J. B. Morrell & Co. ....	145.75
Geo. H. Carey .....	131.17
Geo. L. Neville .....	119.25
Chas. H. Pleasants .....	159.00
Manhattan Supply Co. ....	101.76
S. C. Forsaith Machine Co.* .....	87.45

**Class 23, lumber:**

Joseph W. Duryee .....	4,415.50
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**Class 23—Continued.**

Watson & Pittinger* .....	\$4,289.75
Chas. E. Pell .....	4,442.75

**Class 24, copper:**

Harry L. Briggs .....	90.84
Colwell Lead Co .....	99.00
Geo. H. Carey .....	106.00
Geo. L. Neville .....	212.00
Chas. H. Pleasants .....	89.50
Manhattan Supply Co.* .....	83.35
S. C. Forsaith Machine Co. ....	90.12
McFadden & Co. ....	87.44
Tissot & Schultz .....	101.64
Chas. E. Ring .....	93.70
Aquila Rich .....	93.06

**Class 25, oars:**

Harry L. Briggs .....	290.11
Niemeyer & Bridgers .....	316.99
J. B. Morrell & Co. ....	295.01
Geo. H. Carey .....	290.11
Geo. L. Neville .....	295.00
Chas. H. Pleasants* .....	269.58
Wm. A. Wheeler .....	315.33
Manhattan Supply Co. ....	279.61
Tissot & Schultz .....	274.69
James W. Soper .....	289.19
Aquila Rich .....	271.74

*Proposals for gate valves, steel castings, etc., for the navy-yard, Washington, D. C., under Bureau advertisement dated December 16, 1891; opened January 5, 1892.***Class 1, gate valves:**

Chapman Valve Manufacturing Co. ....	\$4,587.30
Reuker & Mallory .....	2,129.80
Rensselaer Manufacturing Co.* .....	1,469.85
Manhattan Supply Co. ....	3,175.56
Donegan & Swift .....	1,535.50
S. C. Forsaith Machine .....	1,761.58
Geo. L. Neville .....	5,031.00
Edward Barr Co., Limited .....	3,000.00
Colwell Lead Co .....	2,148.90
Wm. C. Codd .....	2,086.50
Charles Millar & Son { A. ....	2,598.00
B. ....	4,585.80

**Class 2, steel castings:**

Geo. L. Neville .....	540.00
Norristown Steel Co. ....	288.00
Standard Steel Casting Co.* .....	306.00
Midvale Steel Co .....	315.00

**Class 3, forgings:**

S. C. Forsaith Machine Co.† .....	\$371.00
Bethlehem Iron Co .....	420.00
Midvale Steel Co.* .....	392.00

**Class 4, steel forgings:**

Bethlehem Iron Co .....	801.00
Midvale Steel Co.* .....	1,007.00

**Class 5, "B" hoop:**

Bethlehem Iron Co .....	194.60
Midvale Steel Co.* .....	183.48

**Class 6, tin:**

J. H. Chesley & Co .....	1,060.00
J. B. Kendall .....	1,068.75
Manhattan Supply Co. ....	1,064.50
S. C. Forsaith Machine Co. ....	1,125.00
Geo. L. Neville .....	1,074.50
American Metal Co., Limited* .....	1,010.00
Aquila Rich .....	1,099.50

*Proposals for furniture etc., for the Naval Academy, Annapolis, Md., under Bureau Advertisement dated December 31, 1891; opened January 19, 1892.***Class 1, chandeliers:**

H. C. Ward .....	\$169.00
The Schultz Gas Fixture and Art Metal Co. ....	203.00
George W. Walther & Co. ....	229.00
C. Y. Davidson & Co.* .....	118.00

**Class 3, carpets:**

Aaron Brag .....	1,531.00
McDowell & Co .....	1,323.15
Julius Lansburgh .....	1,330.80

\* Accepted.

**Class 3—Continued.**

W. B. Moses* .....	\$1,240.95
L. H. Jones & Co .....	1,248.75
G. S. Griffith & Co .....	1,366.85

**Class 4, furniture:**

Aaron Brag .....	1,381.80
Julius Lansburgh .....	1,226.90
W. B. Moses .....	916.00
Robert Mitchell Furniture Co .....	1,744.80

† Informal.

*Proposals for oils, etc., for the navy-yard, Mare Island, California, under Bureau advertisement dated December 30, 1891; opened January 26, 1892.*

## Class 1, 4,000 gallons L. and

## B. oil:

Arctic Oil Works.....	\$3,320.00
Fiske Bros.*.....	2,750.00

## Class 2, 600 gallons cylinder oil:

Arctic Oil Works.....	375.00
Leonard & El is.....	300.00
Eugene J. Ensign.....	360.00
William B. Weir.....	360.00
Charles M. Yates.....	312.00
Fiske Bros.....	333.00

## Class 2—Continued.

Vacuum Oil Co.....	\$390.00
Standard Oil Co. \$.....	300.00
Class 3, cotton waste, etc.:	
Eugene J. Ensign.....	331.00
Chas. M. Yates.....	305.25
Miller, Sloss & Scott *.....	289.25
Dunham, Carrigan & Hayden Co.....	293.00
Charles H. Pleasants.....	387.00
Aquila Rich.....	401.00

*Proposals for naval supplies for the New York navy-yard, under Bureau advertisement dated January 6, 1892; opened January 26, 1892.*

## Class 1, cups, bowls, and plates:

George H. Carey.....	\$2,280.00
J. B. Morrell & Co.....	2,430.00
Ira B. White.....	2,670.00
Haberman Manufacturing Co.....	2,315.70
Francis T. Witte Hardware Co.....	2,040.00
Joseph Wechsler.....	2,017.50
Tissot & Schu z.....	1,980.00
Manhattan Supply Co.....	2,153.10
Ansel W. Paine.....	2,827.50
Newark Sheet Metal Ware Co.....	2,190.00

## Class 2, flannel, 11-ounce (60,000 yards):

B. Y. Pipey & Co.....	57,600.00
Henry T. Kent.....	52,200.00
Wendell, Fay & Co.....	63,600.00
Frank L. Stott.....	67,800.00
Tissot & Schultz.....	74,400.00
S. Allen Evans.....	70,200.00
Sullivan, Vail & Co.....	69,444.00

## Class 3, 6,000 yards enameled cloth:

George H. Carey.....	1,437.00
J. B. Morrell & Co.....	1,452.00
Patrick W. Meehan.....	1,380.00
Tissot & Schultz.....	1,356.00
Harry L. Briggs.....	1,434.00
Wm. A. Wheeler.....	1,560.00
Manhattan Supply Co.....	1,378.20

## Class 4, 1,000 pounds hominy:

Chas. E. Ahrens.....	30.03
Francis Leggett & Co.....	33.95
Thomas W. Ormiston.....	33.10
Edward C. Hazard.....	40.00
Thurber, Whyland & Co.....	36.00

## Class 5, 3,100 gallons pease:

Kemp, Day & Co.....	914.30
Chas. E. Ahrens.....	815.90
Francis H. Leggett & Co.....	984.00
Thomas W. Ormiston.....	761.37
Edward C. Hazard.....	943.00
Manhattan Supply Co.....	931.93
Thurber, Whyland & Co.....	1,004.50

## Class 5½, 2,000 gallons beans:

Kemp, Day & Co.....	618.00
Charles E. Ahrens.....	564.80
John Sharp.....	607.60
Francis H. Leggett & Co.....	610.00

## Class 5½—Continued.

Thomas W. Ormiston.....	\$612.60
Edward C. Hazard.....	740.00
Manhattan Supply Co.*.....	591.80
Thurber, Whyland & Co.....	640.00

## Class 6, 2,000 pounds raisins:

Kemp, Day & Co.....	170.00
Chas. E. Ahrens.....	128.00
John Sharp.....	148.00
Francis H. Leggett & Co.....	140.00
Thomas W. Ormiston.....	119.00
Edward C. Hazard.....	130.00
Manhattan Supply Co.....	124.00
Thurber, Whyland & Co.....	160.00

## Class 7, 2,000 pounds tea †:

Charles L. Ahrens.....	758.00
John Sharp.....	638.00
Francis H. Leggett & Co.....	787.80
Thomas W. Ormiston.....	738.80
Edward C. Hazard.....	780.00
Manhattan Supply Co.....	789.60
Robt. G. Thomas.....	538.00
Thurber, Whyland & Co.....	840.00

## Class 8, 1,200 gallons syrup:

Chas. E. Ahrens.....	348.00
John Sharp.....	345.12
Francis H. Leggett & Co.....	408.00
Thomas W. Ormiston.....	359.64
Edward C. Hazard.....	396.00
Gustave A. Jahn.....	348.00
Thurber, Whyland & Co.....	432.00

## Class 9, 200 gallons oil, L. and

## B.:

Fiske Bros*.....	114.00
Charles H. Pleasants.....	178.00
Bliven & Carrington.....	128.00

## Class 10, 18,000 bolts and nuts:

George H. Carey.....	425.00
P. H. Sternbergh & Son..	443.00
J. B. Morrell & Co.....	430.00
Ira B. White.....	466.00
S. C. Forsaith Machine Co.....	459.80
Donagan & Swift.....	500.00
George L. Neville.....	462.80
McFadden Co.....	465.00
Wm. A. Wheeler.....	650.00
Manhattan Supply Co.....	454.00
Thompson C. Gill & Co.*.....	396.00

## Class 11, fire clay:

J. B. Morrell & Co.....	42.00
S. C. Forsaith Machine Co.....	48.00
Harry L. Briggs.....	37.39
Manhattan Supply Co.....	38.00
Thompson C. Gill & Co.*.....	30.00

\* Accepted.

† No sweep.

‡ Withdrawing.

\$ By lot.

*Proposals for naval supplies for the New York navy-yard, etc.—Continued.*

<b>Class 12, hardware:</b>		<b>Class 16—Continued.</b>	
George H. Carey .....	\$187.70	Manhattan Supply Co.* ..	\$248.89
J. B. Morrell & Co. ....	230.90	Aquila Rich .....	266.82
Ira B. White .....	232.30	<b>Class 17, Albany grease:</b>	
Donegan & Swift .....	240.60	George H. Carey .....	46.50
Geo. L. Neville .....	173.00	Colwell Lead Co. ....	49.50
Harry Briggs* .....	155.95	J. B. Morrell & Co. ....	48.00
Manhattan Supply Co. ....	168.53	Henry McShane Manufac-	
<b>Class 13, belt lacing:</b>		turing Co. ....	66.00
George H. Carey .....	8.60	Donegan & Swift .....	45.00
J. B. Morrell & Co. ....	9.00	Fiske Bros .....	43.50
S. C. Forsaith Machine Co. ....	14.00	Charles H. Pleasants* ..	41.85
Henry McShane Manufac-		George L. Neville .....	52.50
turing Co. ....	7.20	Harry L. Briggs .....	48.00
Donegan & Swift .....	16.00	Manhattan Supply Co. ....	45.00
Charles H. Pleasants .....	11.00	<b>Class 18, paint, etc.:</b>	
George T. Neville .....	16.00	George H. Carey .....	171.50
Manhattan Supply Co. ....	12.60	J. B. Morrell & Co. ....	192.00
Aquila Rich .....	5.72	Ira B. White .....	215.00
Thompson C. Gill & Co. ..	29.96	Fiske Bros. * .....	160.00
<b>Class 14, pipe fittings:</b>		Chas. H. Pleasants .....	174.25
George H. Carey .....	367.00	George L. Neville .....	255.00
Colwell Lead Co. ....	206.97	Manhattan Supply Co. ....	191.60
S. C. Forsaith Machine Co. ....	155.10	Aquila Rich .....	212.00
Henry McShane Manufac-		<b>Class 19, tools, etc.:</b>	
turing Co.* .....	118.64	George H. Carey .....	72.58
Donegan & Swift .....	145.87	Ira B. White .....	101.00
George L. Neville .....	202.25	S. C. Forsaith Machine Co. ....	73.00
Harry L. Briggs .....	149.80	Donegan & Swift .....	66.91
Manhattan Supply Co. ....	142.78	Tissot & Schultz .....	86.25
<b>Class 15, solder and tin:</b>		Chas. H. Pleasants .....	67.10
George H. Carey .....	49.50	Geo. L. Neville .....	88.00
Colwell Lead Co. ....	52.00	McFadden Co. ....	60.34
J. B. Morrell & Co. ....	51.75	Harry L. Briggs .....	56.90
S. C. Forsaith Machine Co. ....	56.75	Manhattan Supply Co.* ..	55.48
Donegan & Swift .....	49.00	<b>Class 20, 500 pounds cotton</b>	
Charles H. Pleasants .....	54.00	waste:	
George L. Neville .....	68.00	J. B. Morrell & Co. ....	45.00
Manhattan Supply Co. ....	52.00	Charles H. Pleasants .....	44.95
Thompson C. Gill & Co. ....	50.45	George L. Neville .....	55.00
<b>Class 16, packing:</b>		Harry L. Briggs .....	43.75
George H. Carey .....	273.20	Manhattan Supply Co.* ..	42.00
J. B. Morrell & Co. ....	308.30	Aquila Rich .....	44.95
Robert M. G. Moore .....	276.10	<b>Class 21, 2 water tubular</b>	
S. C. Forsaith Machine Co. ....	280.00	boilers:	
Donegan & Swift .....	270.40	New York Safety Steam	
Charles H. Pleasants .....	277.80	Power Co. ....	2,550.00
George L. Neville .....	482.50	Babcock & Wilcox .....	3,100.00
Harry L. Briggs .....	273.00	<b>Class 22, 1 condensing set:</b>	
William A. Wheeler .....	290.30	Knowles Steam Pump	
		Works * .....	234.00

*Proposals for naval supplies for the navy yard, Boston, Mass., under Bureau advertisement dated January 8, 1892; opened January 26, 1892.*

<b>Class 1, scroll and resawing</b>		<b>Class 3, band-sawing machine:</b>	
band saw machine:		Egan Co. ....	\$190.00
Egan Co. ....	\$550.00	E. M. C. Davis * .....	110.00
E. M. C. Davis .....	485.00	S. C. Forsaith Machine Co. ....	137.85
S. C. Forsaith Machine		Manhattan Supply Co. ....	173.00
Co.* .....	534.56	<b>Class 4, fire brick, etc.:</b>	
<b>Class 2, band saw, setting and</b>		Charles H. Pleasants .....	490.87
filing machine:		Fiske, Coleman & Co. ....	328.75
Egan Co. ....	50.00	S. C. Forsaith Machine Co. ....	308.75
E. M. C. Davis .....	95.00	S. M. Hamilton .....	364.00
S. C. Forsaith Machine		Manhattan Supply Co.* ..	303.00
Co.* .....	48.50	Thompson C. Gill & Co.* ..	250.10

\* Accepted.

† Informal.



*Proposals for naval supplies for the navy-yard, Boston, Mass., etc.—Continued.*

## Class 5, lard oil:

George L. Neville .....	\$165.00
Charles H. Pleasants .....	145.00
Charles M. Childs & Co. ....	175.00
Fiske Bros* .....	143.75
Aquila Rich .....	147.00

## Class 6, tallow, etc.:

George L. Neville .....	80.00
Chas. H. Pleasants* .....	46.50
Chas. M. Childs & Co. ....	53.00
Gould & Cutler Corpora- tion .....	52.50
Manhattan Supply Co. ....	49.60
Aquila Rich .....	50.75

## Class 7, sperm oil:

George L. Neville .....	175.00
Charles H. Pleasants .....	168.00
Charles M. Childs & Co. ....	168.00
Gould & Cutler Corpora- tion .....	160.00
Fiske Bros.* .....	142.00
Thompson C. Gill & Co. ....	161.00
Aquila Rich .....	155.00

## Class 8, hardware:

Charles H. Pleasants .....	122.31
Chandler & Farquhar .....	125.37
Manhattan Supply Co.* .....	113.64
Thompson C. Gill & Co. ....	185.11

## Class 9, moulders' sand:

George L. Neville .....	123.20
Fiske, Coleman & Co. ....	33.75
Manhattan Supply Co. ....	35.74
Thompson C. Gill & Co. ....	32.90

## Class 10, cotton twine, etc.:

George L. Neville .....	200.00
Manhattan Supply Co.* .....	133.90
Aquila Rich .....	142.00

## Class 11, mattress hair, etc.:

George L. Neville .....	146.00
Chas. H. Pleasants .....	91.10
Manhattan Supply Co. ....	85.13
G. W. Saunnet .....	86.85
Aquila Rich* .....	76.25

## Class 12, galvanized steel wire:

S. C. Forsaith Machine Co. ....	1,427.50
Manhattan Supply Co.* .....	1,314.60
Thompson C. Gill & Co. ....	1,402.50

## Class 13, leather belting:

Boston Woven Hose and Rubber Co .....	109.00
Loeb Bros .....	76.00
George L. Neville .....	84.20
Chas. H. Pleasants .....	76.20
S. C. Forsaith Machine Co. ....	93.20
Manhattan Supply Co. ....	85.00
Graton and Knight Man- ufacturing Co.* .....	70.00
Aquila Rich .....	83.84

\*No award.

## Class 14, packing: †

Boston Woven Hose and Rubber Co .....	\$88.75
Loeb Bros .....	56.85
Geo. L. Neville .....	81.00
Charles H. Pleasants .....	85.17
S. C. Forsaith Machine Co. ....	106.72
Manhattan Supply Co. ....	77.20
Aquila Rich .....	73.90

## Class 15, manila hemp:

Pearson Cordage Co.* .....	8,792.00
Manhattan Supply Co. ....	9,722.00
A. Davis Weld .....	9,175.00

## Class 16, Russian hemp:

G. Ran, Times building .....	2,478.00
S. C. Forsaith Machine Co.* .....	2,456.25
Manhattan Supply Co. ....	2,763.00
A. Davis Weld .....	2,617.50

## Class 17, American hemp:

S. C. Forsaith Machine Co. ....	1,536.00
Manhattan Supply Co. ....	1,596.80
R. C. Morgan & Co.* .....	1,478.40

## Class 18, tar:

R. G. Loftus* .....	150.00
Geo. L. Neville .....	174.00
Chas. H. Pleasants .....	161.25
Chas. M. Childs & Co. ....	225.00
Gould & Cutler .....	165.00
S. C. Forsaith Machine Co. ....	180.00
Manhattan Supply Co. ....	170.00
Aquila Rich .....	188.00

## Class 19, whale oil:

George L. Neville .....	201.00
Chas. H. Pleasants .....	186.00
Chas. M. Childs & Co. ....	192.00
Gould & Cutler* .....	171.00
S. C. Forsaith Machine Co. ....	189.00
Fiske Bros.† .....	171.00
Thompson C. Gill & Co. ....	204.00
Aquila Rich .....	179.25

## Class 20, paints:

Geo. L. Neville .....	242.00
Chas. H. Pleasants .....	110.70
Chas. M. Childs & Co. ....	103.20
Gould & Cutler .....	109.14
Manhattan Supply Co. ....	112.60
Fiske Bros .....	118.95
Aquila Rich* .....	99.60

## Class 21, pipe fittings:

Chas. H. Pleasants* .....	27.24
S. C. Forsaith Machine Co. ....	34.47
Manhattan Supply Co. ....	37.11

## Class 22, drawing materials:

Chas. H. Pleasants* .....	40.65
Manhattan Supply Co. ....	57.65

## Class 23, lumber:

Geo. L. Neville .....	37.50
Chas. H. Pleasants .....	60.00
S. C. Forsaith Machine Co.* .....	36.50

†Decided by lot.

*Proposals for lumber for the New York navy-yard, under Bureau advertisement, January 12, 1892; opened February 2, 1892.*

<b>Class 1, yellow pine:</b>		<b>Class 4, white oak:</b>	
Geo. L. Neville.....	\$4, 890. 55	Geo. L. Neville.....	\$2, 199. 00
Joseph W. Duryee.....	6, 607. 00	South Branch Lumber	
Watson & Pittinger.....	4, 797. 10	Co.*.....	1, 726. 00
James Bigler *.....	3, 827. 00	Joseph W. Duryee.....	1, 974. 00
<b>Class 2, white pine:</b>		Chas. E. Pell.....	1, 759. 00
W. R. Adams & Co.....	3, 814. 00	Watson & Pittinger.....	2, 660. 00
Geo. L. Neville.....	4, 300. 00	Cross, Austin & Co.....	2, 730. 00
South Branch Lumber Co.	3, 297. 50	<b>Class 5, cherry:</b>	
Joseph Duryee.....	3, 786. 00	Geo. L. Neville.....	741. 00
Chas. E. Pell.....	3, 282. 40	Joseph W. Duryee.....	684. 00
George Karr & Co.....	3, 768. 50	Chas. E. Pell *.....	556. 70
Watson & Pittinger.....	3, 262. 00	Watson & Pittinger.....	677. 00
Cross, Austin & Co.....	4, 385. 00	<b>Class 6, mahogany:</b>	
James Bigler.....	3, 732. 00	Geo. L. Neville.....	2, 214. 00
<b>Class 3, poplar:</b>		Joseph W. Duryee.....	2, 280. 00
Geo. L. Neville.....	150. 00	Chas. E. Pell *.....	1, 680. 00
Joseph W. Duryee.....	105. 00	Watson & Pittinger.....	2, 530. 00
Chas. E. Pell *.....	87. 00		
Watson & Pittinger.....	88. 50		
Cross, Austin & Co.....	120. 00		

*Proposals for steel for the navy-yard, Mare Island, California, under Bureau advertisement dated January 21, 1892; opened February 16, 1892.*

<b>Class 1, steel shapes:</b>		<b>Class 2, steel, sheet:</b>	
S. C. Forsaith Machine		S. C. Forsaith Machine Co.	\$728. 91
Co.*.....	\$273. 62	Miller, Sloss & Scott.....	1, 214. 85
Carnegie, Phipps & Co.....	314. 41	Frank H. Woodruff *.....	676. 82
Miller, Sloss & Scott.....	453. 20		

*Proposals for forgings for the Washington navy-yard, under Bureau advertisement dated January 26, 1892; opened February 16, 1892.*

<b>Class 1, gun forgings:</b>		<b>Class 1, gun forgings—Cont'd.</b>	
Carpenter Steel Co.*.....	\$1, 334. 00	Midvale Steel Co.....	\$2, 334. 50

*Proposals for naval supplies for the Naval Academy, Annapolis, Md., under Bureau advertisement dated February 3, 1892; opened February 23, 1892.*

<b>Class 1, bricks, etc.†</b>		<b>Class 5, steel:</b>	
Manhattan Supply Co....	\$1, 499. 90	W. A. Pate.....	\$83. 25
Charles H. Classen.....	766. 00	J. H. Chesley & Co.*.....	63. 62
Niemeyer & Bridges.....	1, 110. 00	Charles H. Pleasants.....	74. 40
Geo. N. Potee.....	689. 00	Hans Hemken.....	66. 82
<b>Class 2, cement, etc.:</b>		Ira B. White.....	120. 00
Charles H. Pleasants.....	233. 75	Aquila Rich.....	69. 23
Hans Hemken*.....	144. 00	McFadden & Co.....	173. 70
Charles H. Classen.....	157. 50	Smith-Courtney Co.....	67. 94
Niemeyer & Bridges.....	155. 00	<b>Class 6, wire, etc.:</b>	
<b>Class 3, dry goods:</b>		W. A. Pate.....	52. 34
Charles H. Pleasants.....	98. 63	Manhattan Supply Co.....	50. 70
Manhattan Supply Co....	80. 15	Tissot & Schultz*.....	58. 50
Ira B. White.....	111. 00	<b>Class 7, hardware:</b>	
R. R. Magruder*.....	74. 67	W. A. Pate.....	380. 81
<b>Class 4, tin, etc.:</b>		J. H. Chesley & Co.....	120. 52
W. A. Pate.....	179. 48	Charles H. Pleasants.....	139. 58
J. H. Chesley & Co.....	192. 88	Manhattan Supply Co....	183. 20
Charles H. Pleasants.....	178. 50	Harry L. Briggs*.....	120. 29
S. C. Forsaith Machine Co.	192. 35	Ira B. White.....	195. 00
Manhattan Supply Co....	176. 25	R. R. Magruder.....	132. 26
Ira B. White.....	222. 00	<b>Class 8, hose, etc.:</b>	
Aquila Rich.....	183. 20	W. A. Pate.....	26. 70
McFadden & Co.*.....	165. 00	J. H. Chesley & Co.....	39. 60
N. & G. Taylor Co.....	170. 19	Charles H. Pleasants.....	36. 00
Colwell Lead Co.....	166. 40	Manhattan Supply Co....	27. 60

\* Accepted.

† No award.

*Proposals for naval supplies for the Naval Academy, Annapolis, Md., etc.—Continued.*

## Class 8—Continued.

Harry L. Briggs .....	\$24.30
Ira B. White .....	50.00
Aquila Rich .....	30.25
McFadden & Co .....	26.20
Smith-Courtney Co.* .....	22.80
R. R. Magruder .....	41.50
William C. Codd .....	40.00

## Class 9, alcohol:

Charles H. Pleasants .....	64.00
Aquila Rich* .....	57.50
Roller & Shoemaker .....	58.63

## Class 10, lard oil:

W. A. Pate .....	72.00
Charles M. Childs & Co. ....	62.45
Charles H. Pleasants .....	64.00
Fiske Brothers .....	62.00
Ira B. White .....	63.00
Aquila Rich* .....	58.50
Roller & Shoemaker .....	62.00
Smith-Courtney Co. ....	59.00
R. R. Magruder .....	60.00

## Class 11, pipe, etc.:

J. H. Chesley & Co.* .....	761.28
Charles H. Pleasants .....	894.20
Manhattan Supply Co. ....	1,071.61
Ira B. White .....	941.10

## Class 11—Continued.

Smith-Courtney Co. ....	\$845.01
Edmond T. Tweedy .....	980.56
Colwell Lead Co .....	908.51
William C. Codd .....	1,049.45

## Class 12, tools:

W. A. Pate .....	49.71
J. H. Chesley & Co .....	46.08
Charles H. Pleasants .....	61.67
S. C. Forsaith Machine Co. ....	68.70
Manhattan Supply Co. ....	43.83
Harry L. Briggs .....	43.13
Tissot & Schultz .....	64.84
Ira B. White .....	72.95
McFadden & Co.* .....	39.79
Smith-Courtney Co. ....	49.16
Colwell Lead Co .....	46.23

## Class 13, sapolio, etc.:

W. A. Pate* .....	33.50
Charles M. Childs & Co. ....	50.00
Charles H. Pleasants .....	39.00
Manhattan Supply Co. ....	41.00
Ira B. White .....	60.00
McFadden & Co .....	39.00
Roller & Shoemaker .....	42.00
R. R. Magruder .....	46.00

*Proposals for naval supplies for the Norfolk navy-yard, under Bureau advertisement dated February 2, 1892; opened February 23, 1892.*

## Class 1, 250 tons bituminous coal:

George L. Neville .....	\$1,250.00
Horace N. Claxton .....	912.50
E. C. Brooks & Co .....	875.00
Niemeyer & Bridgers* ..	870.00

## Class 2, hardware:

George L. Neville .....	134.88
J. H. Chesley & Co .....	157.47
Charles H. Pleasants .....	141.61
Ira B. White .....	197.03
Wm. A. Wheeler .....	167.83
Smith, Courtney & Co.* ..	93.96
W. A. Tate .....	134.69
McFadden & Co .....	116.34
Manhattan Supply Co. ....	132.30
Mayer & Co .....	173.03
Mayer & Co .....	164.89

## Class 3, washers, etc.:

George L. Neville .....	412.34
J. H. Chesley & Co .....	393.13
Ira B. White .....	386.86
Wm. A. Wheeler .....	321.54
Smith-Courtney Co.* .....	308.42
McFadden & Co .....	346.17
Harry L. Briggs .....	634.12
Manhattan Supply Co. ....	393.96
Mayer & Co .....	401.67
J. H. Sternbergh & Son ..	571.80

## Class 4, brushes, etc.:

George L. Neville .....	168.50
J. H. Chesley & Co.* .....	122.75
Charles H. Pleasants .....	245.50
Ira B. White .....	151.80
Wm. A. Wheeler .....	141.52

## Class 4—Continued.

Gould & Cutler .....	\$151.70
W. A. Pate .....	128.30
Harry L. Briggs .....	139.00
Manhattan Supply Co. ....	163.55
Mayer & Co .....	207.50

## Class 5, cement, etc.:

George L. Neville* .....	130.00
Charles H. Pleasants .....	198.75
E. C. Brooks & Co .....	142.75
Niemeyer & Bridgers .....	131.50

## Class 6, roving cotton, etc.:

George L. Neville .....	114.00
Ira B. White* .....	108.00
W. A. Pate .....	118.95
Manhattan Supply Co. ....	137.40

## Class 7, charcoal:

George L. Neville .....	87.45
Charles H. Pleasants .....	155.00
Ira B. White .....	97.50
E. C. Brooks & Co .....	97.50
Chas. M. Childs & Co .....	250.00
Niemeyer & Bridgers* .....	75.00
Mayer & Co .....	100.00

## Class 8, leather, etc.:

George L. Neville .....	20.25
Charles H. Pleasants* .....	19.50
S. C. Forsaith Machine Co. ....	28.50
Ira B. White .....	45.00
Smith-Courtney Co. ....	21.75
Donagan & Swift .....	21.75
W. A. Pate .....	24.30
Mayer & Co .....	24.75

## Class 9, metals:

George L. Neville .....	1,261.82
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\*Accepted.

*Proposals for naval supplies for the Norfolk navy-yard, etc.—Continued.*

<b>Class 9—Continued.</b>		<b>Class 15, alcohol:</b>	
J. H. Chesley & Co .....	\$1,324.74	Chas. H. Pleasants .....	\$102.40
Charles H. Pleasants .....	1,216.30	Roller & Shoemaker* .....	94.00
Ira B. White .....	1,399.50	Aquila Rich .....	95.00
Wm. A. Wheeler .....	1,340.70	<b>Class 16, tar, etc.:</b>	
Donegan & Swift .....	1,272.25	George L. Neville .....	157.20
W. H. Pate† .....		Chas. H. Pleasants .....	162.50
McFadden & Co* .....	1,149.67	Ira B. White .....	305.00
Colwell Lead Co .....	1,274.14	E. C. Brooks & Co .....	161.50
Aquila Rich .....	1,267.06	Roller & Shoemaker* .....	144.50
Harry L. Briggs .....	1,306.23	Chas. K. Smith & Co .....	230.20
Manhattan Supply Co .....	1,467.49	Aquila Rich .....	133.10
Mayer & Co. ....	1,219.25	Charles M. Childs & Co .....	165.00
<b>Class 10, steel rivet rod:</b>		Niemeyer & Bridgers .....	136.00
George L. Neville .....	150.00	Manhattan Supply Co .....	154.50
J. H. Chesley & Co. * .....	96.00	<b>Class 17, lard, oil, etc.:</b>	
Ira B. White .....	105.00	George L. Neville .....	250.00
William A. Wheeler .....	135.00	Chas. H. Pleasants .....	305.00
Midvale Steel Co .....	120.00	Smith-Courtney Co .....	247.50
Aquila Rich .....	112.50	Bourne, Serynser & Co .....	275.00
J. H. Sternbergh & Son .....	97.50	Fiske Brothers .....	261.25
<b>Class 11, iron:</b>		Chas. K. Smith & Co .....	220.94
George L. Neville .....	331.74	Aquila Rich .....	267.50
J. H. Chesley & Co .....	337.65	Chas. M. Childs & Co .....	315.00
S. C. Forsaith Machine Co .....	346.12	Mayer & Co .....	242.50
Ira B. White .....	330.03	Wm. C. Robinson & Sons .....	250.00
William A. Wheeler .....	466.49	<b>Class 18, cylinder oil:</b>	
Smith-Courtney Co .....	* 328.92	George L. Neville .....	127.50
Aquila Rich .....	387.50	Ira B. White .....	118.50
Manhattan Supply Co .....	489.17	Bourne, Serynser & Co .....	174.00
J. H. Sternbergh & Son .....	325.24	Fiske Brothers .....	120.00
<b>Class 12, tool steel:</b>		Chas. K. Smith & Co. * .....	112.13
George L. Neville .....	405.90	Chas. M. Childs & Co .....	117.00
Park Bro. & Co. * .....	279.68	Mayer & Co .....	150.00
W. A. Wheeler .....	311.66	Wm. C. Robinson & Sons .....	150.00
Smith-Courtney Co .....	297.04	<b>Class 19, pipe, etc.:</b>	
Midvale Steel Co .....	434.50	George L. Neville .....	883.64
Carpenter Steel Co .....	381.20	J. H. Chesley & Co .....	1,116.31
Manhattan Supply Co .....	326.59	Chas. Millar & Son .....	851.85
<b>Class 13, rubber gum:</b>		Chas. H. Pleasants .....	994.39
George L. Neville .....	300.00	S. C. Forsaith Machine Co .....	839.52
J. H. Chesley & Co .....	310.00	Ira B. White .....	805.51
Melville Lindsay .....	370.00	Wm. A. Wheeler .....	1,024.86
Charles H. Pleasants* .....	185.00	Smith-Courtney Co .....	1,373.75
S. C. Forsaith Machine Co .....	362.49	Donegan & Swift .....	896.34
Ira B. White .....	274.75	Edman T. Tweedy* .....	790.17
Wm. A. Wheeler .....	235.00	Colwell Lead Co .....	1,034.04
Smith-Courtney Co .....	300.00	Manhattan Supply Co .....	1,818.98
Boston Woven Hose and Rubber Co .....	350.00	Mayer & Co .....	1,188.31
W. A. Pate .....	245.00	<b>Class 20, sandpaper, etc.:</b>	
McFadden & Co .....	322.50	George L. Neville .....	70.55
Aquila Rich .....	243.75	J. H. Chesley & Co .....	74.99
Harry L. Briggs .....	219.00	Chas. H. Pleasants .....	76.06
Manhattan Supply Co .....	300.00	Ira B. White .....	* 69.70
Mayer & Co .....	762.50	Smith-Courtney Co .....	79.68
<b>Class 14, paints:</b>		W. A. Pate .....	97.62
George L. Neville .....	3,026.75	Tissot & Schultz .....	80.60
Charles H. Pleasants .....	2,908.91	Harry L. Briggs .....	62.86
Ira B. White .....	2,661.50	Manhattan Supply Co.† .....	62.31
Wm. A. Wheeler .....	2,953.67	<b>Class 21, cotton waste:</b>	
Gould & Cutler† .....	2,608.79	George L. Neville .....	42.25
Bourne, Serynser & Co.† .....		Charles H. Pleasants .....	40.87
Fiske Brothers .....	2,807.25	Ira B. White .....	40.25
Roller & Shoemaker .....	2,824.58	W. A. Pate .....	37.70
Aquila Rich .....	2,665.14	McFadden & Co .....	36.75
Chas. M. Childs & Co .....	2,714.48	Aquila Rich* .....	36.12
Mayer & Co .....	3,206.90	Manhattan Supply Co .....	46.50

\* Accepted.

† Informal.

*Proposals for naval supplies for the Norfolk navy-yard, etc.—Continued.*

Class 22, pipe staves:		Class 23—Continued.	
Geo. L. Neville.....	\$545.00	J. Davis Reed *.....	\$179.50
E. C. Brooks & Co.....	225.50	Manhattan Supply Co....	315.00

*Proposals for naval supplies for the New York navy yard, under Bureau advertisement, dated February 9, 1892; opened March 1, 1892.*

Class 1, bolts, etc:		Class 7—Continued.	
Donegan & Swift.....	\$124.50	Harry L. Briggs.....	\$57.00
Manhattan Supply Co....	104.32	Chas. H. Pleasants *.....	48.95
J. B. Morrell & Co.....	115.15	Geo. L. Neville.....	90.00
McFadden Co.....	113.55	Class 8, paints:	
James W. Soper.....	110.10	J. B. Morrell & Co.....	847.40
Morse Burtis.....	108.45	Fiske Brothers.....	876.01
Harry L. Briggs.....	114.55	Aquila Rich *.....	748.80
Chas. H. Pleasants.....	108.45	Charles H. Pleasants.....	913.95
J. H. Sternbergh *.....	99.20	Wm. McDonagh & Co.....	846.78
Edward G. Shepard.....	116.78	Chas. M. Childs & Co....	836.45
Wm. H. Wheeler.....	117.89	Gould & Cutler.....	892.45
Geo. H. Carey.....	119.00	Wm. A. Wheeler.....	976.82
Frank H. Woodruff & Co.	119.00	Roller & Shoemaker....	925.95
Chas. E. Ring & Co.....	158.80	Class 9, hardware:	
Geo. L. Neville.....	205.00	Manhattan Supply Co....	30.19
Class 2, yellow pine:		Tissot & Schultz *.....	27.42
James Bigler.....	2,045.50	Harry L. Briggs.....	32.73
Joseph W. Duryee.....	2,472.00	Chas. H. Pleasants.....	44.24
Watson & Pittinger.....	2,039.40	George H. Carey.....	32.68
Charles E. Pell.....	2,369.00	Chas. E. Ring & Co.....	39.91
Graves & Steers.....	2,369.00	Class 10, charcoal:	
Yellow Pine Co.....	2,461.70	Manhattan Supply Co *..	268.50
Jesse I. Eppinger.....	2,163.00	Sam'l G. French.....	255.00
Wm. D. Wheelwright & Co. *	1,854.00	David Duncan & Son....	420.00
George Karr & Co.....	2,137.25	Class 11, coke:	
George L. Neville.....	2,564.70	Samuel G. French.....	200.00
Class 3, spruce piles:		Eugene L. Maxwell *....	171.75
James Bigler.....	1,068.60	David Duncan & Son....	250.00
Joseph W. Duryee.....	1,053.00	Class 12, tools:	
Chas. E. Pell.....	1,014.00	S. C. Forsaith Machine Co	407.87
Graves & Steers.....	955.50	Manhattan Supply Co....	412.28
Yellow Pine Co.....	1,053.00	McFadden Co. *.....	376.59
George Karr & Co.....	1,033.50	James W. Soper.....	402.79
Geo. L. Neville.....	2,340.00	Tissot & Schultz.....	411.37
Class 4, Albany boards:		Eugene L. Maxwell.....	438.46
Joseph W. Duryee.....	55.00	Harry L. Briggs.....	412.92
Watson & Pittinger.....	62.50	Chas. H. Pleasants.....	495.79
Chas. E. Pell *.....	53.75	Wm. A. Wheeler.....	429.74
Yellow Pine Co.....	62.50	Geo. H. Carey.....	503.37
George Karr & Co.....	57.50	Chas. E. Ring & Co.....	442.11
Class 5, white pine, etc.:		Class 13, zinc, etc.:	
Joseph W. Duryee.....	1,710.00	Manhattan Supply Co....	416.90
Watson & Pittinger.....	1,511.00	J. B. Morrell & Co.....	322.50
Chas. E. Pell *.....	1,443.00	James W. Soper.....	339.00
Yellow Pine Co.....	1,663.00	Harry L. Briggs.....	357.00
Geo. L. Neville.....	2,375.00	Aquila Rich.....	304.00
Class 6, oars, ash:		Chas. H. Pleasants *.....	303.46
Manhattan Supply Co....	143.39	Wm. A. Wheeler.....	358.38
J. B. Morrell & Co.....	150.68	Colwell Lead Co.....	348.75
James W. Soper.....	144.33	Geo. H. Carey.....	329.00
Tissot & Schultz.....	146.81	Geo. L. Neville.....	400.00
Aquila Rich *.....	137.30	Class 14, iron:	
Charles H. Pleasants.....	143.76	Manhattan Supply Co....	259.55
Wm. A. Wheeler.....	152.81	Morse Burtis.....	256.70
Geo. H. Carey.....	146.87	Aquila Rich.....	215.50
Geo. L. Neville.....	165.94	Chas. H. Pleasants.....	243.40
Class 7, boat plugs:		J. H. Sternbergh *.....	186.50
J. B. Morrell & Co.....	72.00	Wm. A. Wheeler.....	252.45
		Geo. H. Carey.....	250.00

\* Accepted.

† Informal.

*Proposals for naval supplies for the New York navy-yard, etc.—Continued.*

<b>Class 14—Continued.</b>		<b>Class 20—Continued.</b>	
Frank H. Woodruff & Co.	\$262.50	Fiske Bros.....	\$939.00
Brown & Co. (incorporated).....	309.75	Aquila Rich.....	1,031.44
Chas. E. Ring & Co.....	238.00	Chas. H. Pleasants.....	908.00
Geo. L. Neville.....	290.00	Wm. A. Wheeler.....	1,060.61
<b>Class 15, rivet steel:</b>		Geo. H. Carey.....	1,075.20
Aquila Rich.....	350.00	Chas. E. Ring & Co.....	1,008.00
Chas. H. Pleasants.....	399.00	Geo. L. Neville.....	1,110.25
J. H. Sternbergh*.....	310.00	<b>Class 21, packing:</b>	
Wm. A. Wheeler.....	425.00	S. C. Forsaith Machine Co.	229.20
Midvale Steel Co.....	400.00	Manhattan Supply Co...	196.50
Geo. L. Neville.....	500.00	J. B. Morrell & Co.....	222.00
<b>Class 16, tool steel:</b>		Morse Burtis.....	258.00
Carpenter Steel Co.....	470.00	Harry L. Briggs.....	201.00
Benjamin, Atha & Illingworth Co.....	329.00	Aquila Rich*.....	153.00
Chas. H. Pleasants.....	328.52	Chas. H. Pleasants.....	250.50
Park Brother & Co.....	279.66	Geo. H. Carey.....	189.00
Wm. A. Wheeler.....	329.00	Geo. L. Neville.....	240.00
Brown & Co. (incorporated).....	369.00	<b>Class 22, pumps:</b>	
Midvale Steel Co.....	470.00	Manhattan Supply Co...	805.00
<b>Class 17, pipe and pipe fittings:</b>		J. B. Morrell & Co.....	769.00
S. C. Forsaith Machine Co.*.....	976.40	James W. Soper.....	734.00
Donegan & Swift.....	1,035.23	C. H. Raymond.....	790.00
Manhattan Supply Co...	1,045.06	Aquila Rich.....	815.98
James W. Soper.....	1,042.19	Charles H. Pleasants.....	878.00
Aquila Rich.....	1,055.81	Edward G. Shepard *†...	734.00
Chas. H. Pleasants.....	1,024.82	<b>Class 23, hand force-pumps:</b>	
Wm. A. Wheeler.....	1,159.36	S. C. Forsaith Machine Co.	133.85
Colwell Lead Co.....	1,002.21	Manhattan Supply Co...	131.80
Henry McShane M'fg Co.	1,045.86	J. B. Morrell & Co.....	132.50
<b>Class 18, water-closets:†</b>		James W. Soper.....	124.90
S. C. Forsaith Machine Co.	2,219.00	C. H. Raymond.....	340.00
Manhattan Supply Co...	2,084.00	Eugene L. Maxwell.....	126.00
James W. Soper.....	2,079.52	Aquila Rich*.....	118.83
Eugene L. Maxwell.....	2,204.00	Chas. H. Pleasants.....	125.45
Aquila Rich.....	2,018.50	<b>Class 24, Chapman valves:</b>	
Chas. H. Pleasants.....	2,201.00	S. C. Forsaith Machine Co.	332.78
Wm. Bishop.....	1,986.50	Donegan & Swift.....	282.00
Colwell Lead Co.....	2,140.50	Manhattan Supply Co...	295.00
<b>Class 19, bath tubs:</b>		Eugene L. Maxwell.....	287.00
Manhattan Supply Co...	553.50	Aquila Rich*.....	264.40
James W. Soper*.....	544.55	Chas. H. Pleasants.....	293.84
Aquila Rich.....	516.33	Henry McShane Manufacturing Co.....	290.60
Colwell Lead Co.....	596.62	<b>Class 25, flour:</b>	
<b>Class 20, crucibles:</b>		Manhattan Supply Co...	46.80
S. C. Forsaith Machine Co.	807.00	J. B. Morrell & Co.....	58.50
Manhattan Supply Co*..	798.94	James W. Soper.....	44.07
J. B. Morrell & Co.....	1,075.20	Harry L. Briggs.....	46.80
McFadden Co.....	914.28	Aquila Rich.....	41.47
James W. Soper.....	860.16	Chas. H. Pleasants.....	48.75
Tissot & Schultz.....	1,028.06	<b>Class 26, black oil:</b>	
Eugene L. Maxwell.....	1,091.00	C. H. Raymond.....	50.00
Harry L. Briggs.....	997.00	Fiske Brothers.....	21.00
<b>Class 19, bath tubs:</b>		Aquila Rich*.....	19.00
Manhattan Supply Co.*	\$17,496.00	Chas. H. Pleasants.....	28.00
Marshal T. Davidson.....	23,600.00	Chas. M. Childs & Co.....	56.00
Deane Steam Pump Co...	16,568.00	Roller & Shoemaker.....	23.00
Geo. F. Blake Manu- } A.	16,700.00	<b>Class 25, hardware:</b>	
facturing Co.: } B.	20,464.00	Manhattan Supply Co....	\$101.76
S. C. Forsaith Machine Co†		Harry L. Briggs*.....	98.00

*Proposals for naval supplies for the New York navy-yard, under Bureau advertisement dated February 16, 1892; opened March 8, 1892.*

<b>Class 1, pumps:</b>		<b>Class 2, hardware:</b>	
Manhattan Supply Co.*	\$17,496.00	Manhattan Supply Co....	\$101.76
Marshal T. Davidson.....	23,600.00	Harry L. Briggs*.....	98.00
Deane Steam Pump Co...	16,568.00	<b>Class 3, charcoal:</b>	
Geo. F. Blake Manu- } A.	16,700.00	Samuel G. French §.....	170.00
facturing Co.: } B.	20,464.00	Manhattan Supply Co.*	177.00
S. C. Forsaith Machine Co†			

\* Accepted. † No award.

§ By lot. § Informal.

*Proposals for naval supplies for the New York navy-yard, etc.—Continued.*

<b>Class 4, coke:</b>		<b>Class 12—Continued.</b>	
Samuel G. French .....	\$170.00	Colwell Lead Co .....	\$410.10
Eugene L. Maxwell * .....	128.00	S. C. Forsaith Machine Co. ....	408.50
<b>Class 5, tools:</b>		<b>Class 13, pipe, etc.:</b>	
Manhattan Supply Co. * ..	722.05	Manhattan Supply Co ...	1,033.75
Harry L. Briggs .....	814.29	Henry McShane Manufac-	
Tissot & Schultz .....	868.24	turing Co .....	1,121.38
Wm. A. Wheeler .....	785.10	Wm. A. Wheeler .....	892.62
James W. Soper .....	747.14	Edmond T. Tweedy .....	976.65
Colwell Lead Co .....	875.49	James W. Soper .....	1,204.26
S. C. Forsaith Machine Co. ....	769.19	Edward Barr Co .....	850.45
<b>Class 6, zinc, etc.:</b>		Colwell Lead Co. * .....	762.06
Aquila Rich .....	304.50	S. C. Forsaith Machine Co. ....	1,193.82
Manhattan Supply Co ...	322.00	<b>Class 14, French bath tubs:</b>	
Charles H. Pleasants * ..	301.98	Manhattan Supply Co ...	398.00
Wm. A. Wheeler .....	348.44	James W. Soper * .....	359.85
Geo. L. Neville .....	385.00	S. C. Forsaith Machine Co. ....	383.00
James W. Soper .....	319.50	<b>Class 15, crucibles:</b>	
Colwell Lead Co .....	342.50	Aquila Rich .....	585.90
S. C. Forsaith Machine Co. ....	352.50	Manhattan Supply Co ...	455.90
<b>Class 7, tool steel:</b>		Harry L. Briggs .....	440.82
Midvale Steel Co .....	940.00	Tissot & Shultz .....	558.00
Manhattan Supply Co ...	426.00	Charles H. Pleasants .....	497.55
Wm. H. Spowers * .....	336.50	Wm. A. Wheeler .....	575.75
Wm. A. Wheeler .....	676.00	Geo. L. Neville .....	614.30
Geo. L. Neville .....	752.00	James W. Soper .....	474.40
<b>Class 8, iron:</b>		S. C. Forsaith Machine	
Manhattan Supply Co ...	187.00	Co. * .....	425.45
Wm. H. Spowers * .....	122.30	<b>Class 16, paints:</b>	
Wm. A. Wheeler .....	190.29	Aquila Rich * .....	224.90
Geo. L. Neville .....	160.70	Wm. McDonagh & Co ...	234.30
S. C. Forsaith Machine Co. ....	185.60	Chas. M. Childs & Co .....	228.62
<b>Class 9, sal ammoniac:</b>		Chas. H. Pleasants .....	243.04
Aquila Rich * .....	30.62	Wm. A. Wheeler .....	258.25
Manhattan Supply Co ...	42.00	Roller & Shoemaker .....	242.80
Chas. M. Childs & Co .....	42.50	<b>Class 17, carriage bolts:</b>	
Chas. H. Pleasants .....	30.97	Manhattan Supply Co ...	22.91
Roller & Shoemaker .....	32.50	Chas. H. Pleasants * .....	18.19
Jordan & McLeod .....	55.00	Jordan & McLeod .....	36.46
<b>Class 10, water closets:</b>		<b>Class 18, leather:</b>	
Aquila Rich * .....	570.60	Manhattan Supply Co ...	107.00
Manhattan Supply Co ...	654.00	Chas. H. Pleasants * .....	79.57
Wm. Bishop .....	573.00	Geo. L. Neville .....	103.00
Colwell Lead Co .....	599.40	S. C. Forsaith Machine	
S. C. Forsaith Machine Co. ....	616.50	Co. * .....	58.25
<b>Class 11, force pumps:</b>		<b>Class 19, timber:</b>	
Aquila Rich .....	120.58	Watson & Pittinger .....	937.40
Manhattan Supply Co ...	132.30	James Bigler * .....	846.00
James W. Soper * .....	116.20	Jesse I. Eppinger .....	903.00
S. C. Forsaith Machine Co. ....	141.75	Geo. L. Neville .....	1,075.00
<b>Class 12, Chapman valves:</b>		Chas. E. Pell .....	1,133.00
Aquila Rich * .....	401.10	Wm. D. Wheelwright .....	941.70
Manhattan Supply Co ...	432.60	<b>Class 20, iron and steel:</b>	
Henry McShane Manufac-		Manhattan Supply Co ...	76.00
turing Co .....	430.40	W. H. Spowers * .....	57.50
		S. C. Forsaith Machine Co. ....	78.00

*Proposals for naval supplies for the Norfolk navy-yard, under Bureau advertisement dated February 25, 1892; opened March 15, 1892.*

<b>Class 1, lace springs:</b>		<b>Class 3, lumber:</b>	
S. C. Forsaith Machine Co. ....	\$90.00	E. A. Gaskill * .....	\$1,195.96
Geo. L. Neville .....	80.00	John C. Emmerson .....	1,386.52
Thompson C. Gill & Co. * ..	16.00	Geo. L. Neville .....	1,397.02
<b>Class 2, hardware:</b>		<b>Class 4, packing:</b>	
Ira B. White .....	404.86	J. H. Chesley & Co .....	71.70
J. H. Chesley & Co. * .....	298.52	Manhattan Supply Co ...	60.20
Manhattan Supply Co ...	366.30	Aquila Rich * .....	37.00
Charles H. Pleasants .....	336.72	Geo. L. Neville .....	56.00
Geo. L. Neville .....	306.79		

\*Accepted.



*Proposals for naval supplies for the Norfolk navy-yard, etc.—Continued.*

<b>Class 5, paints:</b>		<b>Class 7—Continued.</b>	
Chas. M. Childs & Co.* ..	\$201.10	J. C. Forsaith Machine Co.	\$105.08
Ira B. White .....	231.15	Smith-Courtney Co.....	108.97
Robt. W. Shoemaker & Co ..	234.05	Edward T. Tweedy.....	104.46
Aquila Rich .....	204.46	Chas. H. Pleasants .....	106.44
Chas. H. Pleasants .....	236.35	Geo. L. Neville .....	121.45
Roller & Shoemaker .....	203.27	<b>Class 8, nuts and rivets:†</b>	
Geo. L. Neville .....	230.65	Ira B. White .....	64.00
<b>Class 6, sheet lead: *</b>		Manhattan Supply Co...	43.60
Ira B. White .....	121.75	Smith-Courtney Co.....	62.14
J. H. Chesley & Co .....	115.51	J. H. Sternbergh .....	45.25
Manhattan Supply Co...	130.00	Geo. L. Neville .....	64.63
Aquila Rich .....	116.25	Thompson C. Gill & Co..	55.60
Smith-Courtney Co.....	124.00	<b>Class 10, oil:</b>	
Chas. H. Pleasants .....	130.50	Fiske Brothers .....	55.00
Geo. L. Neville * .....	111.50	Chas. M. Childs & Co....	70.25
Thompson C. Gill & Co..	140.75	Chas. H. Pleasants .....	72.25
<b>Class 7, pipe, etc.:</b>		Chas. K. Smith & Co.* ..	53.94
Chas. Millar & Son* .....	97.88	Geo. L. Neville .....	72.50
Ira B. White .....	98.48	<b>Class 11, tools:</b>	
J. H. Chesley & Co .....	103.89	Ira B. White .....	60.85
Wm. C. Codd & Co .....	107.80	J. H. Chesley & Co.* .....	41.89
Manhattan Supply Co...	120.82	Tissot & Schultz.....	54.54
		Smith-Courtney & Co .....	42.65
		Geo. L. Neville .....	153.00

*Proposals for naval supplies for the navy-yard, Boston, Mass., under Bureau advertisement dated February 24, 1892; opened March 15, 1892.*

<b>Class 1, cement:</b>		<b>Class 8, paints:</b>	
Manhattan Supply Co...	\$177.00	Chas. M. Childs & Co....	\$126.60
S. C. Forsaith Machine Co.	220.00	Bolles & Wilde .....	142.61
Taylor P. Thompson.....	175.50	Aquila Rich* .....	123.16
Chas. H. Pleasants .....	285.00	Gould & Cutler Corpora- tion .....	128.40
Thompson C. Gill & Co..	186.00	Chas. H. Pleasants .....	136.33
P. O. Riorden* .....	174.00	<b>Class 9, pipe:</b>	
<b>Class 2, brick:</b>		Manhattan Supply Co...	87.79
Manhattan Supply Co.* ..	736.00	S. C. Forsaith Machine Co.	86.12
Granite, Slate and Brick Co .....	960.00	Smith-Courtney Co.....	86.85
Taylor P. Thompson.....	848.00	Bolles & Wilde* .....	83.01
P. O. Riorden .....	872.00	<b>Class 10, lumber:</b>	
<b>Class 3, granite, etc.:</b>		J. O. Wetherbee * .....	409.00
Manhattan Supply Co...	127.40	S. C. Forsaith Machine Co.	484.70
P. O. Riorden* .....	95.00	Jewett Lumber Co .....	416.50
<b>Class 4, frames:</b>		<b>Class 11, door frames:</b>	
J. O. Wetherbee .....	94.50	S. C. Forsaith Machine Co.* .....	47.00
S. C. Forsaith Machine Co.	346.05	Jewett Lumber Co .....	53.50
Jewett Lumber Co.* .....	48.60	<b>Class 12, miscellaneous:</b>	
<b>Class 5, lumber:</b>		Manhattan Supply Co.* ..	27.65
J. O. Wetherbee .....	357.57	Tissot & Schultz .....	51.55
S. C. Forsaith Machine Co.* .....	288.46	Chas. H. Pleasants .....	75.55
Jewett Lumber Co .....	344.00	<b>Class 13, hose:</b>	
<b>Class 6, hardware:</b>		Ansel W. Paine .....	15.00
Ansel W. Payne .....	128.98	Manhattan Supply Co ...	10.00
Bolles & Wilde .....	92.21	Boston Woven Hose and Rubber Co .....	9.00
<b>Class 7, tin:</b>		Boston Belting Co.....	12.50
Manhattan Supply Co...	24.40	Smith-Courtney Co.....	9.00
Bolles & Wilde .....	22.00	Bolles & Wilde .....	12.00
Aquila Rich .....	22.00	Aquila Rich* .....	7.00
Chas. H. Pleasants* .....	21.75	Chas. H. Pleasants .....	12.00
Thompson C. Gill & Co..	22.50		

\*Accepted.

†No award.



*Proposals for naval supplies for the navy-yard, League Island, and naval hospital, Philadelphia, Pa., under Bureau advertisement dated February 23, 1892; opened March 15, 1892.*

<b>Class 1, hardware:</b>		<b>Class 10, paints:</b>	
J. Jacob Shannon & Co.	\$218.53	Robt. Shoemaker & Co.	\$315.75
Manhattan Supply Co.	217.09	J. Jacob Shannon & Co.	337.28
Chas. J. Field*	179.36	Aquila Rich*	252.77
Thompson C. Gill & Co.	319.54	Chas. H. Pleasants	335.10
<b>Class 2, provender:</b>		Roller & Shoemaker	276.35
Chas. H. Pleasants	349.20	Harrison Bros. & Co.	257.42
Paul J. Field, jr.	317.05	Chas. M. Childs & Co.	268.87
Robt. McKnight & Sons*	275.10	<b>Class 11, lime:</b>	
Niemeyer & Bridgers	291.00	J. Jacob Shannon & Co.*	14.70
<b>Class 3, stationery:</b>		Chas. J. Field	16.50
Manhattan Supply Co.*	196.80	Chas. H. Pleasants	41.25
Chas. H. Pleasants	231.63	Paul J. Field, jr.	21.00
<b>Class 4, soap, etc.:</b>		Neimeyer & Bridgers	29.76
Manhattan Supply Co.	29.45	Thompson C. Gill & Co.	17.25
Chas. J. Field*	27.20	<b>Class 12, hose, etc.:</b>	
Chas. H. Pleasants	28.00	Sayen & Austin	470.00
Paul J. Field, jr.	38.05	Aquila Rich*	170.00
Roller & Shoemaker	30.90	Chas. H. Pleasants	740.00
<b>Class 5, twine, rope, etc.:</b>		Boston Woven Hose and Rubber Co.	112.22
Manhattan Supply Co.	95.66	<b>Class 13, pipe fittings:</b>	
Chas. J. Field*	67.94	J. Jacob Shannon & Co.	131.72
Chas. H. Pleasants	70.26	Manhattan Supply Co.	125.09
Paul J. Field, jr.	155.00	Chas. J. Field*	101.53
<b>Class 6, harness, leather, etc.:</b>		S. C. Forsaith Machine Co.	131.42
Manhattan Supply Co.	53.80	Edmond T. Tweedy	129.50
Charles J. Field*	30.40	Smith-Courtney Co.	134.03
Tissot & Schultz	54.33	Ford & Kendig Co.	106.14
Chas. H. Pleasants	33.70	<b>Class 14, packing:</b>	
<b>Class 7, hemlock:</b>		Sayen & Austin	44.00
J. Jacob Shannon & Co.	418.55	S. Jacob Shannon & Co.*	16.50
Stokes Bros., Limited	286.75	Aquila Rich	21.45
R. A. & J. J. Williams*	259.00	Manhattan Supply Co.	24.75
S. C. Forsaith Machine Co.	342.75	Chas. J. Field	25.85
E. A. Gaskill	313.00	Tissot & Schultz	30.25
Chas. P. Maule	296.00	Chas. H. Pleasants	25.30
<b>Class 8, tools:</b>		Edmond T. Tweedy	23.10
J. Jacob Shannon	102.09	Smith-Courtney Co.	22.00
Manhattan Supply Co.	58.07	<b>Class 15, slate, etc.:</b>	
Charles J. Field*	46.16	Manhattan Supply Co.	53.00
Tissot & Schultz	138.11	Chas. J. Field	52.00
Smith, Courtney & Co.	70.33	Chas. H. Pleasants	25.40
<b>Class 9, roofing tin:</b>		Paul J. Field, jr.	44.50
Manhattan Supply Co.	62.00	Thompson C. Gill & Co.*	25.30
Chas. J. Field	59.80	<b>Class 16, laundry machinery:</b>	
Chas. H. Pleasants	64.00	The A. M. Dolph Co.	1,550.00
Paul J. Field, jr.	80.00	Troy Laundry Machinery Co.	1,535.80
Thompson C. Gill & Co.*	44.00		

*Proposals for steel armor plates for the Bath Iron Works, Bath, Me., under Bureau advertisement, dated March 4, 1892; opened March 22, 1892.*

<b>Class 1:</b>	
Carnegie, Phipps & Co.*	\$1,401.12

*Proposals for zinc, iron, etc., for the New York navy-yard, under Bureau advertisement dated March 3, 1892; opened March 22, 1892.*

<b>Class 1, slab zinc:</b>		<b>Class 1—Continued.</b>	
Aquila Rich	\$948.00	New York Smelting and Refining Co.	\$900.00
Geo. Cooper Dennis	930.00	Chas. H. Pleasants	978.00
Manhattan Supply Co.	1,030.00	Colwell Lead Co.	990.00
J. Friedenstein	948.00	Lehigh Zinc and Iron Co.	1,450.00
Edward G. Shepard	988.00		
J. H. Chesley & Co.	1,000.00		

\*Accepted.

[Informal.

*Proposals for zinc, iron, etc., for New York navy-yard, etc.—Continued.*

<b>Class 2, rivets:</b>		<b>Class 4—Continued.</b>	
Tissot & Schultz .....	\$56. 10	Thompson C. Gill & Co..	\$236. 30
Edward G. Shepard .....	62. 50	<b>Class 6, packing:</b>	
Harry L. Briggs .....	71. 25	Aquilla Rich .....	116. 00
Thompson C. Gill & Co.* ..	40. 00	Manhattan Supply Co...	156. 00
<b>Class 3, galvanized iron:</b>		Tissot & Schultz .....	233. 00
George Cooper Dennis...	395. 44	Edward G. Shepard .....	174. 50
Wm. H. Spowers & Co...	401. 31	Harry L. Briggs * .....	105. 50
Merchant & Co.* .....	381. 73	Chas. H. Pleasants .....	445. 00
Manhattan Supply Co...	460. 03	<b>Class 7, pipe-cutters, etc.:</b>	
Edward G. Shepard .....	440. 46	S. C. Forsaith Machine Co.	29. 50
J. H. Chesley & Co .....	464. 93	Manhattan Supply Co...	24. 45
Harry L. Briggs .....	415. 99	Tissot & Schultz .....	35. 70
Thompson C. Gill & Co..	454. 14	Edward G. Shepard .....	23. 49
Chas. H. Pleasants .....	410. 11	Harry L. Briggs .....	22. 06
<b>Class 4, molding sand:</b>		Chas. H. Pleasants * .....	21. 79
Manhattan Supply Co...	495. 50	Colwell Lead Co.....	22. 58
Harry L. Briggs * .....	233. 90		

*Proposals for copper, etc., for the Washington navy-yard, under Bureau advertisement dated March 2, 1892; opened March 22, 1892.*

<b>Class 1, copper:</b>		<b>Class 9, alcohol:</b>	
Manhattan Supply Co...	\$27, 800. 00	Aquilla Rich .....	\$22. 80
J. Friedenstein* .....	25, 180. 00	Chas. H. Pleasants .....	25. 90
J. H. Chesley & Co.....	27, 200. 00	<b>Class 10, iron pipe, etc.:</b>	
M. Lissberger .....	25, 430. 00	J. H. Chesley & Co.* .....	25. 05
Aquilla Rich .....	26, 500. 00	<b>Class 11, rope:</b>	
<b>Class 2, electrical supplies:</b>		Tissot & Schultz .....	31. 50
Manhattan Supply Co...	65. 05	J. H. Chesley & Co .....	24. 94
Tissot & Schultz .....	57. 79	Thompson C. Gill & Co..	27. 30
<b>Class 3, hardware:</b>		Chas. H. Pleasants .....	23. 52
J. H. Chesley & Co.* .....	38. 20	<b>Class 12:</b>	
<b>Class 4, roofing felt:</b>		Tissot & Schultz .....	18. 78
J. H. Chesley & Co.* .....	10. 45	J. H. Chesley & Co.* .....	11. 75
Chas. H. Pleasants .....	17. 50	<b>Class 14, tin and zinc:</b>	
<b>Class 5, window glass:</b>		J. Friedenstein * .....	2, 271. 00
George Ryneal, jr.* .....	44. 40	J. H. Chesley & Co .....	2, 315. 00
Thompson C. Gill & Co ..	46. 66	M. Lissberger .....	2, 296. 00
Chas. Becker .....	46. 36	Aquilla Rich .....	2, 348. 50
Chas. H. Pleasants .....	46. 64	Chas. H. Pleasants .....	2, 648. 50
<b>Class 7, tin roofing:</b>		<b>Class 15, coal:</b>	
J. H. Chesley & Co.* .....	61. 00	Peale, Peacock & Kerr...	3, 444. 00
Thompson C. Gill & Co..	62. 50	Wm. L. Read* .....	3, 195. 00
Chas. H. Pleasants .....	87. 50	<b>Class 17, charcoal:</b>	
<b>Class 8, paints:</b>		John F. Clark* .....	499. 50
Chas. M. Childs & Co....	70. 70	<b>Class 18, sand:</b>	
Geo. Ryneal, jr .....	80. 80	J. W. Paxson & Co.* ....	1, 180. 00
Chas. Becker .....	76. 60	Manhattan Supply Co...	1, 255. 00
Aquilla Rich* .....	69. 72	Thompson C. Gill & Co..	1, 569. 00
Chas. H. Pleasants .....	71. 27		

*Proposals for naval supplies for the navy-yard, Mare Island, under Bureau advertisement dated February 26, 1892; opened March 22, 1892.*

<b>Class 1, washers, etc.:</b>		<b>Class 3, spikes:</b>	
Chas. H. Pleasants .....	\$337. 97	Chas. H. Pleasants .....	\$53. 13
Dunham, Carrigan & Hayden Co.* .....	204. 87	Dunham, Carrigan & Hayden Co.* .....	32. 55
P. H. Sternberg .....	258. 38	Albert Gallatin .....	36. 00
Miller, Sloss & Scott ....	320. 25	P. H. Sternbergh .....	38. 50
Carolan & Co .....	260. 75	Miller, Sloss & Scott ....	34. 30
<b>Class 2, cement:</b>		Carolan & Co .....	42. 00
H. T. Holmes Lime Co...	1, 740. 00	<b>Class 4, Oregon pine:</b>	
Abraham Powell .....	1, 740. 00	Wm. Walker .....	2, 615. 66
A. S. Carman * .....	1,584. 00	F. W. Kreling & Sons...	1, 774. 76

\* Accepted.

*Proposals for naval supplies for the navy-yard, Mare Island, etc.—Continued.*

Class 4—Continued.		Class 11, iron:	
Abraham Powell .....	\$1,720.76	Dunham, Carrigan & Hayden Co.* .....	\$44.03
A. S. Carman * .....	1,563.62	L. M. Kellogg .....	44.65
The Kennedy & Shaw Lumber Co. ....	1,925.86	Albert Gallatin .....	48.34
Class 5, hardware, bolts, etc.:		Miller, Sloss & Scott .....	49.84
Dunham, Carrigan & Hayden Co. ....	61.24	Class 12, steel:	
Albert Gallatin * .....	53.66	Miller, Sloss & Scott* .....	72.50
Miller, Sloss & Scott .....	79.44	Class 13, paints:	
Class 6, hardware:		Chas. H. Pleasants .....	126.88
Chas. H. Pleasants .....	222.20	Aquila Rich* .....	109.45
Dunham, Carrigan & Hayden Co.* .....	163.60	F. N. Woods .....	110.20
Albert Gallatin .....	178.94	Class 14, alcohol:	
Miller, Sloss & Scott .....	215.47	Chas. H. Pleasants .....	44.10
Class 7, window glass:		Aquila Rich .....	35.70
F. H. Rosenbaum .....	223.48	F. N. Woods .....	36.00
F. N. Woods* .....	113.30	Albert Gallatin* .....	34.50
Class 8, lumber:		Class 15, oil:	
Wm. Walker .....	1,027.75	Chas. H. Pleasants .....	135.00
F. W. Kreling & Sons .....	919.00	Leonard & Ellis .....	60.00
Abraham Powell* .....	886.00	Vacuum Oil Co. ....	82.50
A. S. Carman .....	957.50	F. N. Woods .....	75.00
The Kennedy & Shaw Lumber Co. ....	990.50	J. N. Knowles .....	67.50
Class 9, tools, etc:		Albert Gallatin .....	80.00
Dunham, Carrigan & Hayden Co.* .....	130.54	Miller, Sloss & Scott .....	135.00
S. C. Forsaith Machine Co. ....	260.74	Standard Oil Co.* .....	49.00
L. M. Kellogg .....	169.95	Class 16, hose:	
Albert Gallatin .....	136.88	Chas. H. Pleasants .....	19.50
Miller, Sloss & Scott .....	140.87	Aquila Rich* .....	12.50
Carolán & Co .....	152.31	Miller, Sloss & Scott .....	18.75
Class 10, metal:		Class 17, pipe:	
Chas. H. Pleasants .....	42.50	Dunham, Carrigan & Hayden Co. ....	69.49
Aquila Rich .....	34.50	L. M. Kellogg .....	70.16
J. C. Winans .....	31.00	Albert Gallatin * .....	67.38
L. M. Kellogg* .....	24.75	Miller, Sloss & Scott .....	83.91
Thompson C. Gill & Co .....	35.50	Class 18, cotton waste:	
Carolán & Co .....	29.25	Chas. H. Pleasants .....	37.50
		Dunham, Carrigan & Hayden Co.* .....	26.50
		Aquila Rich .....	40.40
		Miller, Sloss & Scott .....	29.00

*Proposals for tobacco for the New York navy-yard, under Bureau advertisement, dated February 27, 1892; opened April 5, 1892.*

Class 1, tobacco:		Class 1, tobacco—Continued.	
Chas. P. Bu- } Sample No.1	\$0.38	I. H. Mayo & Bro. ....	\$0.33
chanan .. } Sample No.2	.35	Wm. A. Nelson, jr. ....	.31 <sup>11</sup> / <sub>100</sub>
Howard W. Spurr & Co ..	.30	Chas. E. Ahrens .....	.30 <sup>24</sup> / <sub>100</sub>
Butler & Boshier .....	.30 <sup>1</sup> / <sub>100</sub>	Francis H. Leggett & Co. ....	.31 <sup>70</sup> / <sub>100</sub>
Manchester Tobacco Co ..	.28	Myers Brothers & Co. ....	.34 <sup>1</sup> / <sub>100</sub>
S. W. Venable Tobacco Co. ....	.28 <sup>8</sup> / <sub>100</sub>	Pierre Lorrillard Co. ....	.27 <sup>95</sup> / <sub>100</sub>
Jas. L. Barbour & Son .....	.36 <sup>8</sup> / <sub>100</sub>		
Manhattan Supply Co. {	Sample Q .....		
	Sample R .....		
	Sample X .....		
	Sample Y .....		

*Proposals for gas coal for the Naval Academy, Annapolis, Md., under Bureau advertisement dated March 18, 1892; opened April 5, 1892.*

Class 1, gas coal: Wm. L. Read * .....	\$838.00
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\* Accepted.

*Proposals for crane, etc., for the New York navy-yard, under Bureau advertisement dated March 19, 1892; opened April 5, 1892.*

<b>Class 1, swinging crane:</b>		<b>Class 3, cotton duck:</b>	
Yale & Towne	{ Bid A * \$2,375.00 Bid B 2,680.00	Aquila Rich	\$255.45
Manufacturing Co.		Tissot & Schultz *	236.50
The Morgan Eng. Co.	4,450.00	J. B. Morrell & Co.	244.92
<b>Class 2, 300 tons bituminous coal:</b>		Manhattan Supply Co.	255.70
Thos. V. Patterson	990.00	<b>Class 4, dowlas, linen, etc:</b>	
Barber & Ziegler	1,095.00	Tissot & Schultz	101.35
Aquila Rich	1,182.00	Joseph Wechsler	72.50
Peale, Peacock & Kerr	1,077.00	J. B. Morrell & Co. *	60.00
Berwind-White Coal Mining Co.	975.00	Manhattan Supply Co.	67.80
David Duncan & Son *	954.00		

*Proposals for gas, oil, etc., for the navy-yard, Portsmouth, N. H., under Bureau advertisement dated March 17, 1892; opened April 5, 1892.*

<b>Class 1, lumber:</b>		<b>Class 3, gas, oil:</b>	
John H. Bronghton *	\$257.00	Rider & Colton	\$240.00
<b>Class 2, miscellaneous:</b>		Gould & Cutler	283.50
Ansel W. Paine	99.25	Fiske Brothers *	210.00
Chas. H. Pleasants *	78.35		

*Proposals for metallic shingles, etc., for the navy-yard, Pensacola, Fla., under Bureau advertisement dated March 16, 1892; opened April 5, 1892.*

<b>Class 2, metallic shingles, etc.:</b>		<b>Class 4, lumber:</b>	
P. J. McKenzie Oerting *	\$258.00	P. J. McKenzie Oerting *	\$35.80
<b>Class 3, hardware:</b>		<b>Class 5, linseed oil:</b>	
P. J. McKenzie Oerting *	99.80	P. J. McKenzie Oerting *†	29.75
		Chas. M. Childs & Co†	29.75

*Proposals for steel, etc., for the navy-yard, Washington, D. C., under Bureau advertisement dated March 15, 1892; opened April 5, 1892.*

<b>Class 1, brass wire:</b>		<b>Class 4, iron:</b>	
Merchant & Co. *	\$236.94	Howard W. Middleton	\$619.00
Harry L. Briggs	264.95	James B. Lambie	610.00
Colwell Lead Co.	258.88	Wm. A. Wheeler	1,047.00
McFadden Co.	279.57	Manhattan Supply Co.	850.00
E. A. Gaskill	254.46	J. B. Kendall *	566.00
James B. Lambie	289.57	J. H. Sternbergh & Son	615.00
Wm. A. Wheeler	263.75	J. H. Chesley & Co.	595.00
Manhattan Supply Co.	243.60	<b>Class 5, tin:</b>	
J. B. Kendall	241.42	Merchant & Co. *	445.00
Donegan & Swift	272.17	McFadden Co.	544.50
Aquila Rich	253.79	Wm. A. Wheeler	615.30
J. H. Chesley & Co.	264.75	Thompson C. Gill & Co.	639.70
<b>Class 2, metals:</b>		J. B. Kendall	648.50
Merchant & Co.	744.43	J. H. Chesley & Co.	559.70
Harry L. Briggs	790.40	<b>Class 6, pig iron:</b>	
Colwell Lead Co.	818.81	Howard W. Middleton	2,962.50
McFadden Co.	805.05	Thompson C. Gill & Co.	3,585.00
James B. Lambie	806.10	J. B. Kendall { Bid A... 2,679.50 Bid B... 3,600.00	
Wm. A. Wheeler	819.26	<b>Class 7, steel plates:</b>	
Manhattan Supply Co.	738.82	Thompson C. Gill & Co.	17.64
J. B. Kendall	751.17	J. B. Kendall	25.20
Donegan & Swift	796.82	Aquila Rich *	15.12
Aquila Rich	745.67	J. H. Chesley & Co.	34.65
J. H. Chesley & Co.	791.56	<b>Class 8, round steel:</b>	
<b>Class 3, sheet steel:</b>		The Benjamin Atha & Illingworth Co. *	130.00
Linden Steel Co. *	168.40	Howard W. Middleton	225.00
J. B. Kendall	187.56		
J. H. Chesley & Co.	208.60		

\*Accepted.

† By lot.

*Proposals for steel, etc., for the navy-yard, Washington, D. C., etc.—Continued.*

## Class 8—Continued.

Park Bro. & Co.....	\$400.00
Midvale Steel Co.....	225.00
Linden Steel Co.....	400.00*
J. B. Kendall.....	200.00
J. H. Chesley & Co.....	243.75

## Class 9, machinery steel:

The Benjamin Atha & Illingworth Co. *.....	1,679.60
Howard W. Middleton..	2,907.00
Park, Brother & Co.....	2,888.00
Midvale Steel Co.....	2,907.00
Linden Steel Co.....	2,328.60
J. B. Kendall.....	1,938.00
J. H. Chesley & Co.....	3,068.50

## Class 10, iron:

Howard W. Middleton..	135.60
Brown & Co., incorporated *.....	131.70
James B. Lambie.....	147.80
Wm. A. Wheeler.....	199.00
Manhattan Supply Co.....	246.00
J. B. Kendall.....	133.60
J. H. Sternbergh & Son..	149.05
J. H. Chesley & Co.....	147.82

## Class 11, tool steel:

Crescent Steel Co.....	2,206.25
The Benjamin Atha & Illingworth Co.....	1,406.00
Sanderson Bros. Steel Co.	2,328.00
Howard W. Middleton..	1,940.00
Park, Bro. & Co. *.....	1,154.31
Brown & Co., incorporated.....	1,516.50
Midvale Steel Co.....	1,940.00
Linden Steel Co.....	2,293.25
Manhattan Supply Co.....	1,911.50
J. B. Kendall.....	1,476.10
J. H. Chesley & Co.....	1,309.50

## Class 12, steel balls:

McFadden Co.....	49.00
Joseph McKee.....	50.00
Manhattan Supply Co.....	54.00
J. B. Kendall.....	42.50

## Class 13, white pine:

Chas. E. Pell.....	1,597.50
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## Class 14, hose:

Harry L. Briggs.....	374.40
McFadden Co.....	462.65
Boston Woven Hose and Rubber Co.....	393.70
Wm. A. Wheeler.....	397.50
Manhattan Supply Co.....	397.30
Gutta Percha and Rubber Manufacturing Co.....	395.60
Smith-Courtney Co.....	411.95
Geo. F. Potter's Son.....	359.50
Aquila Rich.....	336.96

## Class 15, packing:

Crandall Packing Co.....	589.10
Boston Woven Hose and Rubber Co.....	468.29
James B. Lambie.....	490.01
Wm. A. Wheeler.....	585.36

## Class 15—Continued.

Manhattan Supply Co....	\$491.37
Smith-Courtney Co.....	676.25
Aquila Rich.....	458.45

## Class 16, marine:

James B. Lambie.....	28.00
Manhattan Supply Co....	31.00
Smith-Courtney Co.....	28.25

## Class 17, alcohol:

Aquila Rich.....	235.20
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## Class 18, paints:

Chas. Becker.....	339.13
Chas. M. Childs & Co....	329.90
J. B. Kendall.....	297.35
Aquila Rich.....	268.75
Chas. H. Pleasants.....	332.57

## Class 19, tallow:

Chas. Becker.....	45.00
Chas. M. Childs & Co....	40.00
Chas. H. Pleasants.....	31.20

## Class 20, facings:

Harry L. Briggs.....	256.45
Thompson C. Gill & Co..	318.16
Manhattan Supply Co....	300.10
J. B. Kendall.....	239.25
Chas. H. Pleasants.....	273.94

## Class 21, molasses, etc.:

Chas. M. Childs & Co....	47.00
Manhattan Supply Co....	47.25
J. B. Kendall.....	30.50
Chas. H. Pleasants.....	34.80

## Class 22, emery flour:

Harry L. Briggs.....	28.12
McFadden Co.....	36.75
Chas. Becker.....	34.50
Chas. M. Childs & Co....	39.37
Thompson C. Gill & Co..	45.00
Manhattan Supply Co....	52.50
J. B. Kendall.....	33.75
Smith-Courtney Co.....	41.25
J. H. Chesley & Co.....	45.00
Chas. H. Pleasants.....	26.25

## Class 23, candles, etc.:

Harry L. Briggs.....	191.05
Chas. Becker.....	151.09
Wm. A. Wheeler.....	219.67
Manhattan Supply Co....	178.45
J. B. Kendall.....	188.00
Aquila Rich.....	156.45
Chas. H. Pleasants.....	169.78

## Class 24, pipe, etc.:

Robert Leitch & Sons...	455.14
Chas. Millar & Son.....	431.67
Edward Barr Co.....	457.67
Harry L. Briggs.....	437.74
Colwell Lead Co.....	447.15
Howard W. Middleton..	491.59
E. A. Gaskill.....	431.12
Wm. A. Wheeler.....	451.21
Manhattan Supply Co....	513.25
Smith-Courtney Co.....	466.55
Donegan & Swift.....	446.90
J. H. Chesley & Co.....	476.71

\* Accepted.

*Proposals for broken stone for the navy-yard, League Island, Pennsylvania, under Bureau advertisement dated March 31, 1892; opened April 19, 1892.*

<b>Class 1, broken stone:</b>		<b>Class 3, cement—Continued.</b>	
Calvin Tomkins*.....	\$6, 271. 11	Commercial Wood and	
Thos. J. McGovern.....	6, 519. 80	Cement Co.....	\$198. 75
Port Deposit Granite Co.....	9, 388. 95	Hans Hemken.....	213. 00
George L. Neville.....	10, 629. 00	Thompson C. Gill.....	202. 50
<b>Class 3, cement:</b>		Geo. L. Neville.....	240. 00
J. R. Clausen & Son.....	206. 25	<b>Class 4, lumber:</b>	
Morris Ebert.....	204. 75	E. A. Gaskill*.....	558. 80
Calvin Tomkins.....	231. 00	Geo. L. Neville.....	1, 445. 00
Heylin McDonald*.....	193. 50		

*Proposals for boilers, etc., for the Norfolk navy-yard, under Bureau advertisement dated March 30, 1892; opened April 19, 1892.*

<b>Class 1, steel Z bars:</b>		<b>Class 3, boilers:</b>	
Carnegie, Phipps & Co.,		John Baizley.....	\$3, 540. 00
Limited*.....	\$243. 75	Davenport & Potter.....	4, 840. 00
S. C. Forsaith Machine Co.....	255. 00	Robert J. Gray.....	3, 920. 00
George L. Neville.....	600. 00	The Ellicott Machine Co.....	2, 196. 00
<b>Class 2, steel plates:</b>		The E. J. Codd & Co.....	4, 118. 00
Carnegie, Phipps & Co.*.....	234. 00	S. C. Forsaith Machine Co.....	3, 128. 00
S. C. Forsaith Machine Co.....	302. 40	Donegan & Swift*.....	2, 136. 00

*Proposals for electrical supplies for the Mare Island navy-yard, under Bureau advertisement dated April 1, 1892; opened April 19, 1892.*

<b>Class 1, dry goods:</b>		<b>Class 6, tools:</b>	
Thompson C. Gill.....	\$75. 50	Miller, Sloss & Scott*....	\$105. 90
Miller, Sloss & Scott*....	9. 50	<b>Class 7, packing:</b>	
<b>Class 2, hardware:</b>		The Boston Woven Hose	
Miller, Sloss & Scott*....	27. 50	and Rubber Co.....	45. 25
<b>Class 3, copper wire.</b>		Aquila Rich*.....	42. 70
Thompson C. Gill.....	180. 00	Miller, Sloss & Scott.....	63. 00
Miller, Sloss & Scott.....	187. 50	<b>Class 8, gasoline:</b>	
Chas. H. Pleasants*†.....	180. 00	Miller, Sloss & Scott.....	4. 00
Manhattan Supply Co.....	209. 25	<b>Class 9, stationery:</b>	
<b>Class 4, bridles, etc.</b>		Charles H. Pleasants*....	57. 03
Miller, Sloss & Scott*....	30. 70	H. S. Crocker & Co.....	67. 15
<b>Class 5, fire-alarm poles.</b>		<b>Class 10, cotton waste, etc.:</b>	
Miller, Sloss & Scott*....	39. 50	Miller, Sloss & Scott*....	19. 00
		Chas. H. Pleasants.....	30. 50

*Proposals for naval supplies for the navy-yard, New-York, and naval laboratory, Brooklyn, N. Y., under advertisement dated March 29, 1892; opened April 19, 1892.*

<b>Class 1, steel plates:</b>		<b>Class 3—Continued.</b>	
Carnegie, Phipps & Co.*.....	\$1, 236. 89	E. A. Gaskill.....	\$1, 540. 48
Frank H. Woodruff.....	4, 427. 00	Manhattan Supply Co....	1, 537. 59
S. C. Forsaith Machine Co.....	1, 569. 89	Aquila Rich.....	1, 511. 59
A. R. Whitney.....	1, 286. 36	<b>Class 4:</b>	
<b>Class 2, steel plates:</b>		Wm. F. Bernstein.....	1, 071. 00
Carnegie, Phipps & Co.*.....	1, 213. 78	Joseph Wechsler.....	1, 056. 57
S. C. Forsaith Machine Co.....	1, 407. 97	Manhattan Supply Co.*..	1, 041. 70
<b>Class 3, sheet copper:</b>		<b>Class 5, surgical instruments:</b>	
J. Friedenstein.....	1, 535. 66	Kersten & Kaysan.....	1, 721. 62
J. H. Chesley & Co.....	1, 588. 62	Richard Kny & Co.....	1, 739. 52
Mayer, Lane & Co.....	1, 578. 99	Chas. H. Pleasants.....	1, 903. 46
Revere Copper Co.....	1, 509. 19	Sumner F. Dudley.....	1, 737. 86
Ansonia Brass & Copper		Manhattan Supply Co.*.....	1, 622. 94
Co.....	1, 444. 20	<b>Class 6, surgical appliances:</b>	
Merchant & Co.....	1, 510. 48	John Gallagher.....	1, 907. 02
Park, Bro. & Co.*.....	1, 405. 69	Chas. H. Pleasants.....	1, 866. 98
Frank H. Woodruff.....	1, 829. 32	McKesson & Robbins.....	1, 701. 55
Donegan & Swift.....	1, 588. 62	Manhattan Supply Co.*.....	1, 625. 95
S. C. Forsaith Machine Co.....	1, 636. 76		

\* Accepted.

† By lot.

*Proposals for naval supplies for the navy-yard, New York, etc.—Continued.*

## Class 7, dispensary furniture.

John Gallagher.....	\$615.63
Chas. H. Pleasants.....	506.79
McKesson & Robbins.....	432.41
Manhattan Supply Co.....	387.92

## Class 8, hospital furniture:

Manhattan Supply Co.*..	412.18
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## Class 9, copper tubing.

J. H. Chesley & Co.....	431.76
Ansonia Brass and Copper Co.....	432.10
Bloomsburg Brass and Copper Co.*.....	389.14
Merchant & Co.....	432.10
Morse Burtis.....	432.10
McFadden Co.....	451.91
Colwell Lead Co.....	464.23
Frank H. Woodruff.....	476.42
Donegan & Swift.....	432.10
S. C. Forsaith Machine Co.....	452.49
E. A. Gaskill.....	432.10
Henry McShane Manufacturing Co.....	487.48
Manhattan Supply Co.....	398.88
Aquila Rich.....	431.76

## Class 10, brass tubing:

J. H. Chesley & Co.....	106.72
Ansonia Brass and Copper Co.....	109.84
Bloomsburg Brass and Copper Co.....	102.08
Merchant & Co.....	125.28
Morse Burtis.....	111.36
McFadden & Co.....	111.36

## Class 10—Continued.

Colwell Lead Co.....	\$117.39
Frank H. Woodruff.....	116.00
Donegan & Swift.....	109.04
S. C. Forsaith Machine Co.....	111.36
E. A. Gaskill.....	111.36
Henry McShane Manufacturing Co.....	122.58
Manhattan Supply Co.*..	99.76
Aquila Rich.....	108.99

## Class 11, brass tubing:

J. H. Chesley & Co.....	366.52
Ansonia Brass and Copper Co.....	366.52
Bloomsburg Brass and Copper Co.*.....	340.34
Merchant & Co.....	366.52
McFadden Co.....	382.22
Frank H. Woodruff.....	418.88
Donegan & Swift.....	366.52
S. C. Forsaith Machine Co.....	382.22
E. A. Gaskill.....	366.52
Henry McShane Manufacturing Co.....	392.70
Manhattan Supply Co.....	366.52
Aquila Rich.....	366.26

## Class 12, gauges:

McFadden Co.*.....	862.44
Manning, Maxwell & Moore.....	1,025.80
Donegan & Swift.....	944.00
S. C. Forsaith Machine Co.....	972.40
Crosby Steam Gauge and Valve Co.....	1,078.68
Manhattan Supply Co.....	890.80

*Proposals for broadswords for the naval training station, Newport I. I., under Bureau advertisement dated April 7, 1892; opened May 3, 1892.*

## Class 1, 95 broadswords:

Horstman Bros. & Co.*.....	\$213.75
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*Proposals for gravel for the Naval Academy, Annapolis, Md., under Bureau advertisement dated April 14, 1892; opened May 3, 1892.*

## Class 1, gravel:

Daniel J. Sanders*.....	\$171.00
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*Proposals for steel plate for the New York navy-yard, under Bureau advertisement dated April 15, 1892; opened May 3, 1892.*

## Class 1, steel plates:

Carnegie, Phipps & Co.*.....	\$119.14
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*Proposals for coal, etc., for the navy-yard and naval hospital, Norfolk, Va., under Bureau advertisement dated April 13, 1892; opened May 3, 1892.*

## Class 1, 185 tons anthracite:

W. J. Parks.....	\$822.50
David Duncan.....	819.00
Niemeyer & Bridgers.....	784.87
Nattingham & Wrenn.....	787.50
A. A. McCullough.....	901.25

## Class 2, electrical supplies:

Geo. L. Neville.....	\$541.20
Thompson C. Gill & Co.....	993.95
Manhattan Supply Co.*..	196.25

\*Accepted.

*Proposals for naval supplies for the New York navy-yard, under Bureau advertisement dated April 12, 1892; opened May 3, 1892.*

<b>Class 1, hardware:</b>		<b>Class 11, stationery:</b>	
Harry J. Briggs .....	\$284. 10	Manhattan Supply Co...	\$293. 00
Manhattan Supply Co.* ..	279. 18	Jno. M. Bulwinkle * .....	239. 64
J. B. Morrell & Co. ....	299. 00	<b>Class 12, spruce piles:</b>	
Tissot & Schultz .....	304. 93	Chas. E. Pell .....	1, 145. 94
<b>Class 2, canvas:</b>		Geo. L. Neville .....	1, 917. 00
Eugene L. Maxwell† .....	98. 97	James Bigler * † .....	1, 145. 94
Manhattan Supply Co. ....	151. 50	Joseph W. Duryee .....	1, 167. 24
J. B. Morrell & Co.* .....	135. 84	<b>Class 13, 1,500 barrels Portland cement:</b>	
Tissot & Schultz .....	138. 75	James Brand .....	3, 345. 00
<b>Class 3, kitchen furniture:</b>		Morris Ebert .....	3, 945. 00
Tissot & Schultz* .....	452. 55	Arthur C. Babson * .....	3, 225. 00
Manhattan Supply Co. ....	539. 64	Hans Hemken .....	3, 427. 35
<b>Class 4, curled hair:</b>		Alfonso de Navarro .....	3, 435. 00
Geo. L. Neville .....	444. 50	<b>Class 14, lumber:</b>	
McFadden & Co.* † .....	395. 00	Chas. E. Pell .....	631. 50
Aquila Rich .....	440. 00	Geo. L. Neville .....	753. 00
Harry L. Briggs .....	399. 40	Watson & Pittinger * ..	600. 00
Manhattan Supply Co. ....	399. 00	Joseph W. Duryee .....	628. 50
J. B. Morrell & Co. ....	395. 00	<b>Class 16, spikes:</b>	
Thompson C. Gill & Co..	500. 00	McFadden Co .....	29. 50
<b>Class 5, paints:</b>		Harry L. Briggs .....	27. 50
Chas. M. Childs * .....	170. 60	Manhattan Supply Co ..	27. 00
McFadden Co .....	201. 35	J. B. Morrell & Co .....	41. 25
Aquila Rich .....	181. 22	Thompson C. Gill & Co.*	25. 00
J. B. Morrell & Co. † .....	135. 25	Joseph Wechsler .....	390. 00
Wm. McDonagh .....	181. 10	<b>Class 17, indicators:</b>	
<b>Class 6, alcohol:</b>		Edward Barr Co .....	840. 00
Aquila Rich * .....	33. 30	McFadden Co.* .....	748. 00
<b>Class 7, miscellaneous:</b>		Eugene L. Maxwell † .....	297. 60
Harry L. Briggs .....	78. 90	Manhattan Supply Co..	760. 00
Manhattan Supply Co. ....	77. 80	<b>Class 18, cotton duck:</b>	
J. B. Morrell & Co.* .....	72. 40	Manhattan Supply Co...	2, 549. 75
Tissot & Schultz .....	95. 60	J. B. Morrell & Co.* .....	2, 481. 08
<b>Class 8, boat chains, etc.:</b>		Tissot & Schultz .....	2, 517. 95
Eugene L. Maxwell * .....	94. 11	F. Coit Johnson .....	2, 606. 50
Manhattan Supply Co. ....	94. 30	<b>Class 19, grommets, etc.:</b>	
Tissot & Schultz .....	206. 50	George L. Neville .....	74. 00
<b>Class 9, duck:</b>		McFadden Co .....	91. 96
Eugene L. Maxwell † .....	18. 44	Harry L. Briggs .....	72. 15
Manhattan Supply Co..	36. 00	Eugene L. Maxwell .....	70. 60
J. B. Morrell & Co.* .....	32. 80	Manhattan Supply Co.* ..	70. 10
Tissot & Schultz .....	33. 25	J. B. Morrell & Co .....	75. 50
<b>Class 10, ravens duck:</b>		Tissot & Schultz .....	74. 25
Manhattan Supply Co.* ..	30. 40		
J. B. Morrell & Co .....	32. 75		

*Proposals for naval supplies for the navy-yard, Mare Island, California, under Bureau advertisement dated April 9, 1892; opened May 10, 1892.*

<b>Class 1, bolts and nuts:</b>		<b>Class 4, drawing materials:</b>	
Dunham, Carrigan & Hayden Co.* .....	\$22. 00	Cunningham, Curtis & Welch .....	\$102. 10
M. M. Buck & Co .....	30. 30	Charles H. Pleasants .....	98. 93
Miller, Sloss & Scott .....	34. 60	H. S. Crocker Co.* .....	88. 15
<b>Class 2, hardware:</b>		Hawley Brothers Hardware Co. ....	102. 20
Dunham, Carrigan & Hayden Co.* .....	91. 61	Manhattan Supply Co ..	109. 00
Hawley Brothers Hardware Co. ....	125. 00	Miller, Sloss & Scott ....	119. 90
M. M. Buck & Co. ....	134. 80	<b>Class 5, lamps, etc.:</b>	
Miller, Sloss & Scott .....	127. 72	Nathan Dohmann§ .....	139. 00
<b>Class 3, miscellaneous:</b>		Bresch Lamp Co. ....	152. 20
Charles H. Pleasants* .....	78. 21	M. M. Buck & Co.* .....	123. 30
Miller, Sloss & Scott .....	81. 90	Miller, Sloss & Scott ....	185. 00

\* Accepted.

† Withdrawn.

‡ By lot.

§ Informal.



*Proposals for naval supplies for the navy-yard, Mare Island, California, etc.—Continued.*

<b>Class 6, tools:</b>		<b>Class 9, paints:</b>	
Dunham, Carrigan & Hayden Co.*	\$534.95	Chas. H. Pleasants	\$89.52
Hawley Brothers Hardware Co.	626.04	M. M. Buck & Co.	81.87
M. M. Buck & Co.	628.75	Aquila Rich*	66.52
Miller, Sloss & Scott	656.55	<b>Class 10, pipe:</b>	
<b>Class 7, metals:</b>		Dunham, Carrigan & Hayden Co.*	152.11
Charles H. Pleasants	157.75	M. M. Buck & Co.	218.01
Dunham, Carrigan & Hayden Co.*	91.35	Miller, Sloss & Scott	232.06
M. M. Buck & Co.	121.50	E. A. Gaskill	189.06
Manhattan Supply Co.	141.60	Oscar J. Backus	252.20
Miller, Sloss & Scott	124.50	<b>Class 11, stationery:</b>	
E. A. Gaskill	161.90	Cunningham, Curtis & Welch	14.80
<b>Class 8, packing:</b>		Charles H. Pleasants	23.62
W. F. Bowen	190.75	H. S. Crocker Co.*	14.05
M. M. Buck & Co.*	174.25	Miller, Sloss & Scott	21.50
Manhattan Supply Co.	265.00		
Miller, Sloss & Scott	292.00		
Aquila Rich	205.15		

*Proposals for lumber, etc., for the navy-yard, League Island, Pennsylvania, under Bureau advertisement dated April 27, 1892; opened May 17, 1892.*

<b>Class 1, cement:</b>		<b>Class 2, sand and stone:</b>	
Chas. C. McColgan Co.*	\$180.00	George L. Neville*	\$145.00
Morris Ebert	201.00	<b>Class 3, lumber:</b>	
George L. Neville	240.00	E. A. Gaskill*	1,257.50
Thompson C. Gill & Co.	202.50	Geo. L. Neville	2,550.00
J. Jacob Shannon & Co.	261.00		

*Proposals for steel plates, etc., for the navy-yard, Norfolk, Va., under Bureau advertisement dated April 26, 1892; opened May 17, 1892.*

<b>Class 1, steel plates, etc.:</b>		<b>Class 3, bolts and nuts:</b>	
Carnegie, Phipps & Co.*†	\$1,755.00	Geo. L. Neville*	\$182.25
The Wellman Iron & Steel Co.	1,755.00	E. A. Gaskill	234.50
<b>Class 2:</b>		J. H. Sternbergh	194.09
George L. Neville	3,750.00	<b>Class 4, sheet rubber:</b>	
E. A. Gaskill*	2,500.00	George L. Neville*	77.50
W. C. Cooke	3,750.00	<b>Class 5, pipe, etc.:</b>	
		George L. Neville	546.35
		E. V. White & Co.*	530.00

*Proposals for ordnance supplies for the Washington navy-yard, under Bureau advertisement dated April 25, 1892; opened May 17, 1892.*

<b>Class 1, taps and dies:</b>		<b>Class 2—Continued.</b>	
Eugene L. Maxwell	\$112.02	A. P. Swoyer	\$1,983.24
M. M. Buck & Co.	96.92	McFadden Co.	1,232.01
Manhattan Supply Co.	127.39	James W. Soper	1,219.33
George L. Neville	100.76	S. C. Forsaith Machine Co.*	1,107.51
J. H. Chesley & Co.	103.56	<b>Class 3, drill rods:</b>	
Harry L. Briggs	107.77	Crescent Steel Co.*	81.46
Peter A. Frasse & Co.*	96.89	M. M. Buck & Co.	177.30
McFadden Co.	104.71	Manhattan Supply Co.	182.00
James W. Soper	104.44	J. B. Kendall	99.49
S. C. Forsaith Machine Co.	98.81	J. H. Chesley & Co.	139.05
<b>Class 2, drills:</b>		Harry L. Briggs	99.20
Eugene L. Maxwell	1,325.71	Peter A. Frasse & Co.	94.44
M. M. Buck & Co.	1,221.99	McFadden Co.	99.05
Manhattan Supply Co.	1,337.43	James W. Soper	96.85
George L. Neville	1,369.85	<b>Class 4, emery wheels:</b>	
J. H. Chesley & Co.	1,208.15	M. M. Buck & Co.	589.97
Harry L. Briggs	1,288.88	Manhattan Supply Co.	517.60
Peter A. Frasse & Co.	1,192.88		

\* Accepted.

† By lot.

*Proposals for ordnance supplies for the Washington navy-yard, etc.—Continued.*

## Class 4—Continued.

George L. Neville.....	\$540.00
Harry L. Briggs.....	424.24
White & Dodson.....	477.85
Peter A. Frasse & Co.....	409.93
Sterling Emery Wheel Co.....	460.12
A. P. Swoyer.....	583.60
McFadden Co.....	402.16
James W. Soper.....	494.78
S. C. Forsaith Machine Co.....	485.77
Abrasive Material Co.*.....	401.52

## Class 5, dies, chasers, etc.:

Eugene L. Maxwell.....	127.25
M. M. Buck & Co.....	178.30
Manhattan Supply Co.....	133.34
George L. Neville.....	427.44
Harry L. Briggs.....	127.77
Peter A. Frasse & Co.*.....	101.56
McFadden Co.....	122.44
James W. Soper.....	121.98

## Class 6, punches, etc.:

Eugene L. Maxwell.....	281.30
M. M. Buck & Co.....	270.50
Manhattan Supply Co.....	437.10
Harry L. Briggs.....	255.55
White & Dodson.....	297.50
Peter A. Frasse & Co.*.....	247.65
McFadden Co.....	303.62
James W. Soper.....	269.70

## Class 7, oilers:

Eugene L. Maxwell.....	50.50
M. M. Buck & Co.....	46.75
Manhattan Supply Co.....	67.60
George L. Neville.....	110.00
J. H. Chesley & Co.....	57.41
Harry L. Briggs.....	55.55
White & Dodson *.....	45.55
Peter A. Frasse & Co.....	57.44

## Class 8, tools:

Eugene L. Maxwell.....	256.11
M. M. Buck & Co.....	282.51
Manhattan Supply Co.....	262.00
Harry L. Briggs.....	242.42
Peter A. Frasse & Co.....	248.09
McFadden Co.*.....	215.41
James W. Soper.....	259.86
S. C. Forsaith Machine Co.....	266.61

## Class 9, calipers, etc.:

Eugene L. Maxwell.....	360.00
M. M. Buck & Co.*.....	241.50
Manhattan Supply Co.....	371.60
Harry L. Briggs.....	291.00
Peter A. Frasse & Co.....	349.20
McFadden Co.....	267.60

## Class 10, rope:

Thompson C. Gill & Co..	219.75
Chas. H. Pleasants.....	196.19
M. M. Buck & Co.....	224.88
Manhattan Supply Co.....	200.25
George L. Neville.....	201.17
McFadden Co.....	206.75

## Class 11, hydraulic jack:

Thompson C. Gill & Co..	320.00
Charles H. Pleasants.....	254.60
Eugene L. Maxwell.....	234.00
M. M. Buck & Co.....	270.00
Manhattan Supply Co.....	269.60
George L. Neville.....	271.00
J. B. Kendall.....	233.72

## Class 11—Continued.

Francis H. Stillman.....	\$218.00
Harry L. Briggs.....	230.00
White & Dodson.....	259.80
Peter A. Frasse & Co.....	218.50
McFadden Co.....	231.60
James W. Soper.....	219.60
S. C. Forsaith Machine Co.*.....	179.00

## Class 13, canvas, cotton:

Tissot & Schultz.....	173.12
J. B. Morrell & Co.*.....	168.50
Chas. H. Pleasants.....	174.25
Manhattan Supply Co.....	255.00
Geo. L. Neville.....	177.50
J. B. Kendall.....	187.50
W. D. Clarke & Co.....	257.50
McFadden Co.....	196.25

## Class 14, canvas, flax:

Tissot & Schultz.....	203.00
J. B. Morrell & Co.....	245.00
Chas. H. Pleasants *.....	197.58
W. D. Clarke & Co.....	207.50
McFadden Co.....	261.00

## Class 15, dry goods:

Manhattan Supply Co.....	132.30
Geo. L. Neville.....	208.50
White & Dodson*.....	115.85
W. D. Clarke & Co.....	134.25
McFadden Co.....	137.69

## Class 16, vises, etc.:

Eugene L. Maxwell.....	733.25
M. M. Buck & Co.....	715.79
Harry L. Briggs*.....	611.11
McFadden Co.....	680.94
S. C. Forsaith Machine Co.....	723.24

## Class 18, cotton waste:

Thompson C. Gill & Co..	600.00
Tissot & Schultz.....	534.00
Chas. H. Pleasants.....	515.40
M. M. Buck & Co.*.....	495.00
Manhattan Supply Co.....	531.00
Geo. L. Neville.....	600.00
J. B. Kendall.....	495.00
White & Dodson.....	538.20
McFadden Co.....	495.00

## Class 19, leather:

Chas. H. Pleasants.....	161.00
M. M. Buck & Co.....	217.12
Manhattan Supply Co.*.....	152.00
George L. Neville.....	192.00
J. B. Kendall.....	202.00
McFadden Co.....	166.58

## Class 20, bolts and nuts:

Manhattan Supply Co.....	1,171.95
Geo. L. Neville.....	1,133.50
J. B. Kendall.....	989.77
Harry L. Briggs.....	811.11
McFadden Co.....	993.56
J. H. Sternberg.....	1,064.95

## Class 21, fire brick:

Chas. E. Pope & Co.....	722.00
Geo. L. Neville.....	1,000.00
J. T. Walker Sons.....	900.00
J. B. Kendall.....	596.00
Jas. H. McGill*.....	560.00
Cyrus Borgner.....	800.00
S. C. Forsaith Machine Co.....	880.00

\* Accepted.

† By lot.

*Proposals for ordnance supplies for the Washington navy-yard, etc.—Continued.*

<b>Class 22, crucibles:</b>	
Thompson C. Gill & Co.	\$260.00
Chas. H. Pleasants	240.80
M. M. Buck & Co.	286.00
Geo. L. Neville	274.00
J. B. Kendall	252.00
Harry L. Briggs	286.00
White & Dodson	262.00
McFadden Co.	212.40
James W. Soper	296.40
S. C. Forsaith Machine Co.*†	212.40

Class 23, files:	
Tissot & Schults	1,012.15
Eugene L. Maxwell	816.01
M. M. Buck & Co.	808.92
J. H. Chesley & Co.	795.49
Harry L. Briggs	829.28
F. P. May & Co.*	718.34
Peter A. Frasse & Co.	736.81
McFadden Co.	752.72
James W. Soper	737.87
Pierson & Co.	847.61
S. C. Forsaith Machine Co.	765.09

Class 25, castings:	
Midvale Steel Co .....	1,030.75
Norristown Steel Co.*...	942.40
Standard Steel Casting Co	1,280.00
S. C. Forsaith Machine Co.	1,310.52

Class 25, forgings:	
Carpenter Steel Co .....	307.30
Midvale Steel Co .....	245.84
Park Bro. & Co., limited.	338.03
Pierson & Co.....	199.74
Benjamin Atha & Illingworth Co. ....	184.38

Class 26, tool steel:	
Carpenter Steel Co .....	2, 890.00
Crescent Steel Co .....	4, 439.50
M. M. Buck & Co. ....	12, 270.00
Manhattan Supply Co .....	2, 770.00
J. B. Kendall .....	1, 967.00
Midvale Steel Co .....	3, 170.00
Park Bro. & Co., limited.	2, 924.40
Brown & Co .....	2, 430.50

Class 26—Continued.	
Pierson & Co.....	\$3,391.50
Benjamin Atha & Illingworth Co.*.....	1,946.75

Class 27, soft steel:	
Carpenter Steel Co.....	500.00
M. M. Buck & Co.....	700.00
J. B. Kendall.....	284.00
Midvale Steel Co.....	400.00
Park Bro. & Co., limited.	430.00
S. C. Forsaith Machine Co.	364.00
Benjamin Atha & Illingworth Co."	282.00

Class 28, wrought iron:	
J. B. Kendall* .....	140. 00
S. C. Forsaith Machine Co.	196. 50

Class 29, forging:	
J. B. Kendall* .....	91.20

Class 30, steel wire:	
Thompson C. Gill & Co.	198.00
Chas. H. Pleasants.	170.48
Eugene L. Maxwell.	162.00
M. M. Buck & Co.	167.20
Manhattan Supply Co.	179.80
George L. Neville.	173.98
J. B. Kendall.	179.20
White & Dodson.	175.80
McFadden Co.	167.20
S. C. Forsaith Machine Co.	146.41

Class 31, lubricator, etc:	
M. M. Buck & Co.....	68.40
White & Dodson .....	60.00
McFadden Co.* .....	41.90

Class 32, trucks:		
Thompson C. Gill & Co.		598.00
Eugene L. Maxwell		520.00
M. M. Buck & Co.		700.00
Geo. L. Neville		630.00
J. B. Kendall		700.00
White & Dodson		744.00
McFadden Co.		600.00
S. C. Forsaith Ma-	A	658.00
chine Co.	B	616.00
	C	690.00

*Proposals for points, etc., for the New York navy-yard, under Bureau advertisement dated May 10, 1892; opened May 13, 1892.*

Class 1, nuts:	
Manhattan Supply Co...	\$38.00
Tissot & Schultz .....	37.00
Class 2, brushes:	
Manhattan Supply Co...	71.50
Tissot & Schultz .....	59.00
Thompson C. Gill & Co..	74.19
Class 3, paints, etc.:	
Chas. H. Pleasants.....	892.32

Class 3—Continued.	
Aquila Rich.....	\$839.00
Chas. M. Childs & Co <sup>b</sup> ...	836.65
Alex. H. Doty .....	862.00
New York Insulating Paint Co.....	932.25
Wm. McDonagh .....	848.75

*Proposals for cement, etc., for the navy-yard and naval hospital, Washington, D. C., under Bureau advertisement May 11, 1891; opened May 15, 1891.*

<b>Class 1, cement:</b>	
Catmaack & Decker.....	\$310.00
James H. McGill.....	323.33
Joseph G. & J. M. Waters.....	393.33
Clark Bros.*.....	293.00

Class 3, steel forgings:	
Benjamin Atha & Mingsworth Co., .....	\$299.91

Class 2, buffer springs:	
S. C. Forsaith Machine Co.	106.00
Thompson C. Gill & Co.,*	59.76

Samuel J. Pope & Co . . . .	2,375.00
Zeller & Co . . . . .	2,486.00
Hendley & Biggs . . . . .	2,832.50
Blake & Williams* . . . .	1,984.00

\*Accepted.

† Decided by lot.

*Proposals for furniture for the naval training station, Newport, R. I., under Bureau advertisement dated May 23, 1892; opened June 10, 1892.*

The Bowditch & Pruden Co.....	\$5, 158.20	Classes 2 and 3, provender (open purchase).
W. B. Moses & Sons*....	4, 761.35	

*Proposals for boiler tubes, etc., for the New York navy-yard, under Bureau advertisement dated May 17, 1892; opened June 10, 1892.*

<b>Class 1, 8,000 boiler tubes:</b>		<b>Class 3—Continued:</b>	
Wm. A. Wheeler*.....	\$4, 535.28	Chas. E. Ahrens.....	\$290.50
Morris, Tasker & Co.....	5, 280.00	Tissot & Schultz.....	280.00
S. C. Forsaith Machine Co.	6, 456.00	<b>Class 4, hose:</b>	
Gilchrist & Taylor.....	9, 720.00	Thompson C. Gill & Co..	20.81
<b>Class 2, shaft struts:</b>		Tissot & Schultz*.....	19.00
<b>Standard Steel Casting Co.*.....</b>		<b>Class 5, paints:</b>	
Midvale Steel Co.....	2, 687.50	Chas. M. Childs & Co..	155.85
Norristown Steel Co.....	3, 440.00	Aquila Rich*.....	153.50
<b>Class 3, cotton waste:</b>		Wm. A. Wheeler.....	178.25
Chas. M. Childs & Co... ..	301.87	Chas. H. Pleasants.....	163.70
McFadden Co.....	287.00	Shoemaker & Busch.....	161.80
Henry McShane M'fg Co.	297.50	<b>Class 6, oils, lubricating:</b>	
Wm. A. Wheeler.....	306.25	Bliven & Carrington...	630.00
Manhattan Supply Co... ..	277.50	Fiske Brothers*.....	596.00
Morse Burtis.....	302.50	Borne, Scrymser & Co... ..	620.00
Thompson C. Gill & Co.*.	253.75	<b>Class 7, 50,000 pounds butter:</b>	
Charles H. Pleasants....	274.22	Chas. E. Ahrens*.....	12, 325.00
		Simpson, McIntire & Co.	12, 496.00

*Proposals for lumber, etc., for the navy-yard, League Island, Pennsylvania, under Bureau advertisement dated May 20, 1892; opened June 10, 1892.*

<b>Class 1, baskets, etc.:</b>		<b>Class 5—Continued:</b>	
Thompson C. Gill & Co..	\$59.30	Aquila Rich.....	\$236.50
Chas. J. Field.....	58.00	A. P. Swoyer & Co.....	309.35
A. P. Swoyer & Co.*.....	47.00	<b>Class 6, pipe, etc.:</b>	
<b>Class 2, cement, Portland:</b>		McFadden Co.....	133.30
Thompson C. Gill & Co..	101.50	Chas. Millar & Son.....	131.71
Alfonzo de Navarro.....	93.45	S. C. Forsaith Machine Co.	160.97
George L. Neville.....	105.00	Ford & Kendig Co.*.....	124.25
Shoemaker & Busch.....	108.50	Chas. J. Field.....	125.60
A. P. Swoyer & Co.....	96.25	A. P. Swoyer & Co.....	132.77
<b>Class 3, lumber:</b>		<b>Class 7, deck light:</b>	
E. A. Gaskill*.....	1, 723.50	Benj. H. Shoemaker*....	63.50
George L. Neville.....	2, 806.50	McFadden Co.....	69.77
<b>Class 4:</b>		A. P. Swoyer & Co.....	72.25
Thompson C. Gill & Co..	37.80	<b>Class 8, lumber, yellow pine:</b>	
McFadden Co.*.....	21.36	E. A. Gaskill*.....	1, 980.00
Chas. J. Field.....	51.96	George L. Neville.....	2, 160.00
A. P. Swoyer & Co.....	25.20	<b>Class 9, white oak:</b>	
<b>Class 5, paints, etc.:</b>		E. A. Gaskill*.....	962.10
Lewis M. Bean & Co....	276.50	<b>Class 10, Muntz metal:</b>	
John Lucas & Co.....	275.00	McFadden Co.....	116.00
Shoemaker & Busch.....	235.30	Chas. J. Field*†.....	116.09
Chas. M. Childs & Co... ..	213.95	A. P. Swoyer & Co.....	116.00

*Proposals for electrical supplies, etc., for the Norfolk navy-yard, under Bureau advertisement dated May 27, 1892; opened June 10, 1892.*

<b>Class 1, electrical supplies:</b>		<b>Class 2, Portland cement:</b>	
International Trading and Electric Co.....	\$606.74	International Trading and Electric Co.....	\$141.75
E. S. Greeley & Co.....		Niemeyer & Bridgers....	130.50
Manhattan Supply Co....	1, 040.40	E. S. Greeley & Co.....	155.25
Chas. H. Pleasants.....	600.20	Chas. H. Pleasants.....	168.75
E. V. White & Co.....	638.39	Alfonso de Navarro.....	138.60
Tissot & Schultz.....	906.50	E. V. White & Co.*.....	126.00
Geo. L. Neville*.....	600.00	George L. Neville.....	130.50

\* Accepted.

† By lot.

‡ Informal.

*Proposals for horizontal engine for the navy-yard, League Island, Pennsylvania, under Bureau advertisement dated May 28, 1892; opened June 16, 1892.*

**Class 1, horizontal engine:**

The Providence Steam Engine Co.\* ..... \$5,984.00

*Proposals for machine tools for the League Island navy-yard, under Bureau advertisement dated June 6, 1892; opened June 21, 1892.*

**Class 1, plate-straightening machine:**

S. C. Forsaith Machine Co. \$2,975.00  
Wm. H. Wood ..... 4,775.00  
Bement, Miles & Co ..... 4,550.00  
The Hills & Jones Co.\* ..... 2,675.00  
Niles Tool Works ..... 3,450.00

**Class 2, milling machine:**

S. C. Forsaith Machine Co.\* ..... 1,775.00  
Pedrick & Ayer ..... 1,800.00

**Class 3, planing machine:**

Pedrick & Ayer\* ..... 1,500.00

**Class 4, hoisting and pile-driving engine:**

Donegan & Swift ..... 878.00  
George W. Williamson ..... 1,103.00  
Stockton Bartron\* ..... 750.00

**Class 5, hemlock:**

E. A. Gaskill ..... 1,461.00  
Chas. Esté\* ..... 1,176.00

**Class 6, yellow pine:**

E. A. Gaskill ..... 1,305.00  
Chas. Esté\* ..... 1,068.75

**Class 7, bolts and nuts:**

Tissot & Schultz ..... 148.00  
A. P. Swoyer & Co. .... 109.52  
Billamy & Cochrane\* ..... 107.70  
McFadden Co ..... 128.60  
Chas. J. Field ..... 137.92

**Class 8, manila:**

Tissot & Schultz ..... 59.50  
A. P. Swoyer & Co. .... 80.75  
McFadden Co ..... 63.75  
Chas. J. Field ..... 45.69

**Class 9, netting:**

Tissot & Schultz ..... 72.00  
A. P. Swoyer & Co. .... 43.50  
McFadden Co ..... 39.00  
Chas. J. Field\* ..... 39.00

**Class 10, cups, oil:**

Billamy & Cochrane ..... 79.20  
McFadden Co ..... 83.28  
Thompson G. Gill & Co.\* ..... 47.93  
Chas. J. Field ..... 79.87

**Class 11, belting:**

A. P. Swoyer & Co. .... 552.20  
Graton & Knight ..... 533.90

**Class 11—Continued.**

Donegan & Swift ..... \$618.50  
Billamy & Cochrane ..... 684.30  
Aquila Rich ..... 612.28  
McFadden Co ..... 770.80  
Chas. J. Field ..... 757.60  
Loeb Bros ..... 558.18

**Class 12, tools:**

S. C. Forsaith Machine Co.\* ..... 357.57  
Billamy & Cochrane ..... 380.66  
McFadden Co ..... 412.19  
The Hills & Jones Co.† ..... 400.49  
Chas. J. Field ..... 400.49

**Class 13, metals:**

A. P. Swoyer & Co.\* ..... 86.50  
Donegan & Swift ..... 92.00  
Aquila Rich ..... 89.00  
McFadden Co ..... 90.00  
Chas. J. Field ..... 88.50

**Class 14, packing:**

Tissot & Schultz\* ..... 19.20  
A. P. Swoyer & Co. .... 20.82  
Billamy & Cochrane ..... 56.04  
Aquila Rich ..... 84.20  
McFadden Co ..... 68.05  
Chas. J. Field ..... 56.50

**Class 15, oil:**

Chas. M. Childs & Co.\* ..... 152.00  
Aquila Rich ..... 168.00  
Chas. J. Field ..... 173.50

**Class 16, pipe, etc:**

A. P. Swoyer & Co. .... 155.22  
Billamy & Cochrane ..... 168.76  
McFadden Co ..... 153.11  
The Hills & Jones Co.† ..... 143.98  
Chas. J. Field\* ..... 143.98

**Class 17, files, etc.:**

Tissot & Schultz ..... 50.33  
A. P. Swoyer & Co. .... 54.56  
Billamy & Cochrane ..... 51.57  
McFadden & Co.\* ..... 50.22  
Chas. J. Field ..... 50.41

**Class 18, candles, etc.:**

Billamy & Cochrane\* ..... 44.30  
Thompson G. Gill & Co. .... 118.08  
Chas. J. Field ..... 90.20

*Proposals for steel plates, etc., for the New York navy-yard under Bureau advertisement dated May 31, 1892; opened June 21, 1892.*

**Class 1, steel plates:**

Linden Steel Co ..... \$2,916.48  
Frank H. Woodruff & Co. .... 2,871.61  
Carnegie, Phipps & Co. .... 2,916.49  
Wellman Iron and Steel Co ..... 2,692.15

**Class 2, steel shapes:**

Carnegie, Phipps & Co.\* ..... 1,247.26

**Class 3, lumber:**

Yellow Pine Co. .... \$1,323.00  
Joseph W. Duryee ..... 1,392.61  
James Bigler ..... 1,260.00  
Chas. E. Pell ..... 1,645.00  
Watson & Pittinger ..... 1,244.50  
Wm. D. Wheelwright\* ..... 1,197.00  
Jesse I. Eppinger ..... 1,413.00

\* Accepted.

† Informal.

*Proposals for steel plates, etc., for the New York navy-yard, etc.—Continued.*

<b>Class 4, automatic cut-off engine:</b>		<b>Class 6, 4 drill motors:</b>	
Electro-Dynamic Co.....	\$1,166.00	General Electric Co.....	\$2,439.36
M. M. Buck & Co.....	1,045.00	Electro-Dynamic Co.*....	1,512.88
W. R. Fleming & Co.....	1,053.00	<b>Class 7, 1 drill motor:</b>	
The Ball Engine Co.*.....	1,022.00	General Electric Motor..	1,184.24
<b>Class 5, 1 dynamo:</b>		Electro-Dynamic Co.*.....	737.15
General Electric Co.....	992.91	<b>Class 8, wire, etc.:</b>	
Electro-Dynamic Co.....	1,141.57	General Electric Co.....	579.78
Manhattan Supply Co....	868.00	Electro-Dynamic Co.....	730.69
C. & C. Electric Motor Co.*	700.00	Manhattan Supply Co....	2,273.20
		Western Electric Co.*....	527.11
		Tissot & Schultze.....	624.10

*Proposals for ordnance supplies for the navy-yard, Washington, D. C., under Bureau advertisement dated June 1, 1892; opened June 21, 1892.*

<b>Class 1, lumber:</b>		<b>Class 6, steel:</b>	
A. P. Swoyer & Co.*.....	\$3,782.52	Midvale Steel Co.....	\$771.84
<b>Class 2, bolts and nuts:</b>		Carpenter Steel Co.....	900.48
J. H. Sternbergh.....	860.12	J. B. Kendall*.....	418.08
Harry L. Briggs.....	796.41	Temple & Lockwood....	1,286.40
A. P. Swoyer & Co.....	802.79	<b>Class 7, forgings:</b>	
J. B. Kendall*.....	757.59	Midvale Steel Co.....	12,276.00
McFadden Co.....	759.99	Carpenter Steel Co.*....	5,728.80
James B. Lambie.....	800.52	Temple & Lockwood....	24,552.00
Tissot & Schultze.....	837.05	<b>Class 8, casting:</b>	
<b>Class 3, files:</b>		Standard Steel Casting Co.*.....	675.00
M. M. Buck & Co., B.....	824.87	Eureka Cast Steel Co....	810.00
Eugene L. Maxwell.....	752.85	Midvale Steel Co.....	787.50
Harry L. Briggs.....	781.94	Solid Steel Co.....	675.00
A. P. Swoyer & Co.....	804.88	Norristown Steel Co.....	720.00
James W. Soper.....	739.04	<b>Class 9, differential purchase:</b>	
F. P. May & Co.*.....	733.25	S. C. Forsaith Machine Co.	177.00
McFadden Co.....	777.38	A 1.....	98.00
James B. Lambie.....	792.14	B 1.....	75.00
Tissot & Schultze.....	834.13	C 2.....	61.00
<b>Class 4, castings:</b>		D 1.....	98.00
Standard Steel Casting Co	756.00	James W. Soper*.....	117.00
Eureka Cast Steel Co.*..	648.00	J. B. Kendall.....	220.00
Midvale Steel Co.....	864.00	McFadden Co.....	181.12
Solid Steel Co.....	810.00		
Norristown Steel Co.....	864.00		
<b>Class 5, angles:</b>			
S. C. Forsaith Machine Co.*.....	154.77		

*Proposals for naval supplies for the navy-yard, Mare Island, California, under Bureau advertisement dated June 2, 1892; opened June 28, 1892.*

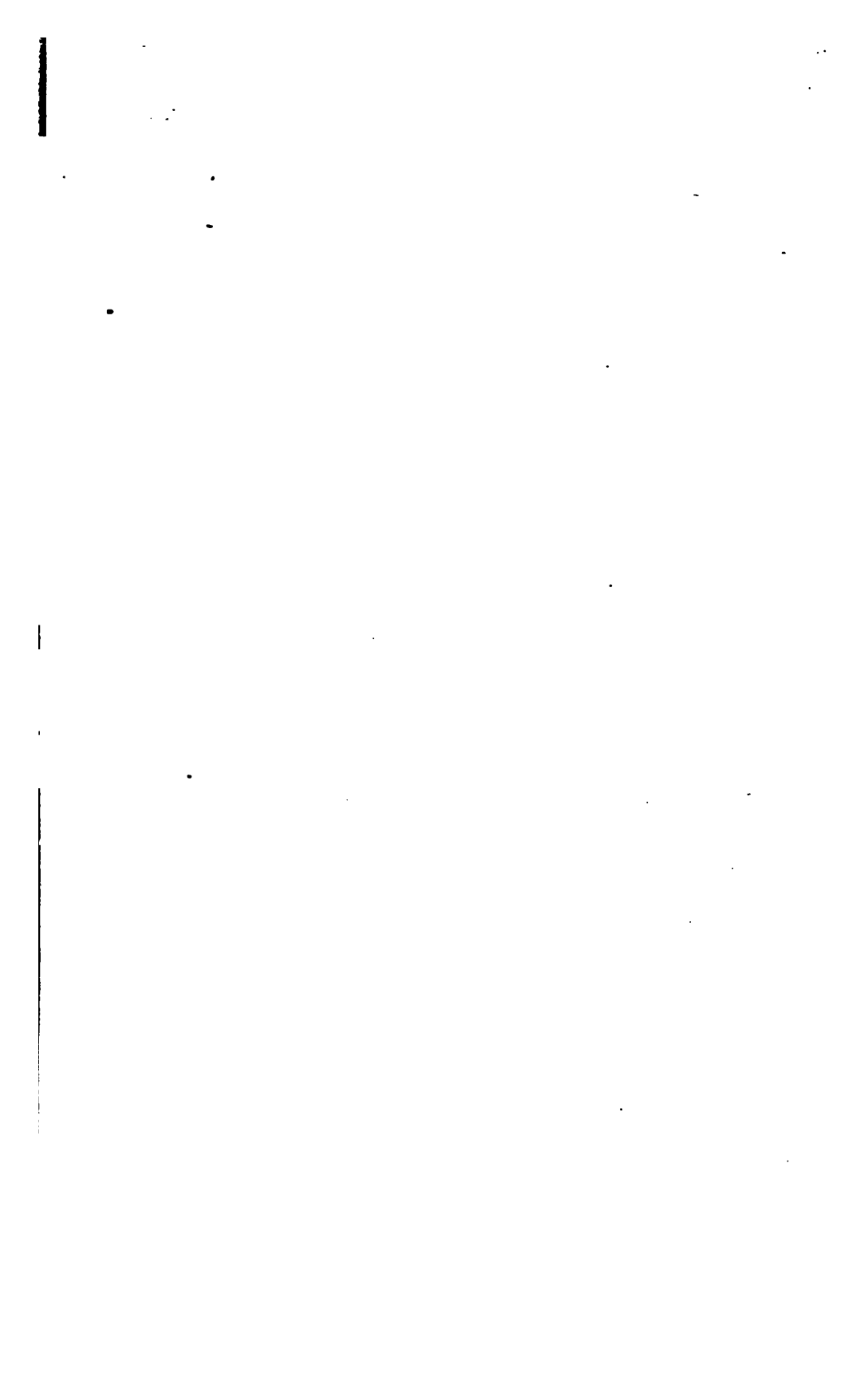
<b>Class 1, 5,000 gallons lubricating and burning oil:</b>		<b>Class 4, teakwood:</b>	
W. F. Whittier.....	\$3,500.00	A. Powell.....	{ A \$2.10
Fiske Brothers.....	3,637.50	A. S. Carman.....	{ 17,850.00
Arctic Oil Works.....	4,150.00		{ B 1.92
<b>Class 2, 1,050 gallons cylinder oil:</b>		Asa L. White.....	23,375.00
Bosshardt & Wilson Co..	630.00	F. W. Kreling & Sons....	18,360.00
Leonard & Ellis.....	525.00		11,985.00
Standard Oil.....	472.50	<b>Class 5, miscellaneous—O. P.</b>	
W. F. Whittier.....	162.00	<b>Class 6, manila:</b>	
W. A. Freeman.....	614.25	S. C. Forsaith Machine Co.*.....	181.70
Fiske Brothers.....	472.50	<b>Class 7, drawing material:</b>	
Arctic Oil Works.....	504.00	H. S. Crocker & Co.*....	43.45
Ensign & McGuffick.....	598.50	<b>Class 8, stationery:</b>	
<b>Class 3, 100 gallons lubricating oil:</b>		Dutton & Partridge.....	133.53
Bosshardt & Wilson Co..	50.00	H. S. Crocker & Co.*....	129.00
W. F. Whittier.....	50.00	<b>Class 9, provender:</b>	
Arctic Oil Works.....	38.00	Ellis & Miller*.....	98.58
Ensign & McGuffick.....	40.00		

\* Accepted.

*Proposals for naval supplies for the New York navy-yard, under Bureau advertisement dated June 13, 1892; opened June 29, 1892.*

<b>Class 1:</b>		<b>Class 13:</b>	
Manhattan Supply Co. . . . .	\$48.60	Manhattan Supply Co. . . . .	\$1,583.60
Harry L. Briggs . . . . .	49.50	McFadden Co. . . . .	1,302.47
J. B. Morrell & Co. * . . . .	43.87	Harry L. Briggs* . . . . .	1,037.82
<b>Class 2:</b>		Eugene L. Maxwell . . . . .	1,163.85
Fiske Brothers . . . . .	8,064.00	S. C. Forsaith Machine Co. . . . .	1,209.29
E. H. Kellogg . . . . .	9,800.00	<b>Class 14:</b>	
Bliven & Carrington . . . . .	8,820.00	E. H. Kellogg* . . . . .	768.61
<b>Class 3:</b>		<b>Class 15:</b>	
T. J. Gilroy & Co. . . . .	1,200.00	Manhattan Supply Co.* . . . .	82.38
McFadden Co. . . . .	75.39	<b>Class 16:</b>	
J. B. Morrell & Co. . . . .	49.10	Manhattan Supply Co.* . . . .	38.00
S. C. Forsaith Machine Co. . . . .	547.60	<b>Class 17:</b>	
<b>Class 4:</b>		Manhattan Supply Co. . . . .	916.40
Manhattan Supply Co.* . . . .	31.98	Gutta Percha and Rubber	
McFadden Co. . . . .	75.39	Manufacturing Co.* . . . .	754.20
J. B. Morrell & Co. . . . .	49.10	Aquila Rich . . . . .	879.80
S. C. Forsaith Machine Co. . . . .	547.60	S. C. Forsaith Machine Co. . . . .	943.75
<b>Class 5:</b>		Boston Woven Hose . . . . .	787.90
McFadden Co. . . . .	81.96	Reverse Rubber Co. . . . .	1,341.30
Harry L. Briggs * . . . .	32.19	<b>Class 18:</b>	
J. B. Morrell & Co. . . . .	258.60	Manhattan Supply Co. . . . .	491.88
<b>Class 6:</b>		Gutta-percha and Rubber	
Manhattan Supply Co.* . . . .	187.80	Manufacturing Co.* . . . .	467.05
McFadden Co. . . . .	278.80	John L. Schultz . . . . .	463.99
Harry L. Briggs . . . . .	189.48	Aquila Rich . . . . .	496.53
John L. Schultz . . . . .	240.00	Page Belting Co. . . . .	574.80
J. B. Morrell & Co. . . . .	188.76	Boston Woven Hose . . . . .	563.02
<b>Class 7:</b>		<b>Class 19:</b>	
Manhattan Supply Co. . . . .	54.00	Charles M. Childs & Co.* . . . .	158.22
McFadden Co.* . . . .	43.40	Aquila Rich . . . . .	166.52
John L. Schultz . . . . .	51.60	<b>Class 20:</b>	
J. B. Morrell & Co. . . . .	51.20	Manhattan Supply Co. . . . .	195.53
S. C. Forsaith Machine Co. . . . .	45.60	Harry L. Briggs . . . . .	249.70
<b>Class 8:</b>		Eugene L. Maxwell . . . . .	212.71
Manhattan Supply Co.* . . . .	32.35	S. C. Forsaith Machine Co.* . . . .	189.97
<b>Class 9:</b>		<b>Class 21:</b>	
Manhattan Supply Co. . . . .	636.23	Manhattan Supply Co.* . . . .	185.47
Harry L. Briggs * . . . .	519.65	John M. Bulwinkle . . . . .	207.83
<b>Class 10:</b>		<b>Class 22:</b>	
Manhattan Supply Co.* . . . .	477.90	Manhattan Supply Co. . . . .	2,876.43
John L. Schultz . . . . .	489.86	McFadden Co. . . . .	2,784.77
<b>Class 11:</b>		Harry L. Briggs* . . . . .	2,634.40
Manhattan Supply Co.* . . . .	262.26	S. C. Forsaith Machine Co. . . . .	2,988.22
Wm. Porter's Sons . . . . .	262.80	<b>Class 23:</b>	
<b>Class 12:</b>		Manhattan Supply Co.* . . . .	32.50
Manhattan Supply Co.* . . . .	93.60	J. B. Morrell & Co. . . . .	47.00
S. C. Forsaith Machine Co. . . . .	109.00		

\* Accepted.





REPORT  
OF THE  
CHIEF OF BUREAU OF MEDICINE AND SURGERY.

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NAVY DEPARTMENT,  
BUREAU OF MEDICINE AND SURGERY,  
*Washington, D. C., October 15, 1892.*

SIR: I have the honor to submit the statistical report of the health of the Navy for the year 1891, together with estimates for the fiscal year ending June 30, 1894, the condition of the naval-hospital fund, and the naval medical establishment.

NAVAL HOSPITALS, SANATORIUM, SICK QUARTERS, AND NAVY-YARDS.

*Widow's Island, Penobscot Bay, Maine.*—Condition continues good, and only a few repairs have been required. The iron tank in the basement was cemented and a manhole in sewer pipe repaired; repairs to air pump; 16 valves placed in service pipes for the purpose of shutting off the water from the different floors without deranging the entire sanitary apparatus of the building; the eastern side of roof of old hospital building was shingled; one man and team employed for six days in hauling gravel for road and walks and improvement of grounds; replacement of four water-closet basins cracked by cold weather.

No cases of yellow fever have been received at Widows Island.

Apropos of the question whether this hospital will be practically available as a refuge for naval vessels with infectious and contagious diseases, I quote herewith from my report of 1889 the measures which were then successfully resorted to in the cases of the *Boston* and *Yantic*, both ships being infected with yellow fever:

In November, 1888, the *Boston* arrived at quarantine, New York, with three cases of yellow fever on board. Eight cases had occurred, of which three recovered.

In January, 1889, the *Yantic* arrived at the same quarantine with three cases of yellow fever. Six cases had occurred, of which four recovered.

Both ships before leaving quarantine were thoroughly cleaned and disinfected with a solution of mercuric chloride and repeated fumigations with sulphurous acid gas. All textile fabrics were subjected to one or the other of these agents, and in the case of the *Yantic* were exposed to a temperature several degrees below 32° F.

The ships from quarantine went directly to the navy-yard, and as an additional security the officers and men were transferred to the receiving ships and the *Chicago*, coal was taken from the bunkers and consumed in the yard, five fumigating chambers were fitted for the reception of the ship's stores, and every part of the ships was thoroughly cleaned, fumigated, and disinfected.

No cases of the fever have since occurred on said ships.

From the success that attended the reception, fumigation, discharge, and subsequent condition of these ships at the quarantine and navy-

yard, it is probable that ships in the future infected with yellow fever will enter the quarantine port at New York, unless otherwise directed.

*Portsmouth (N. H.) Naval Hospital.*—Since the hospital buildings were accepted from the contractors the following-named improvements have been made: Blasting and removal of ledge for a carriage road in front of hospital, a distance of about 150 feet; blasting and removing ledge in grounds, making a total of about 67 square rods; extensive filling-in between hospital and sea, and other depressions in grounds, and drawing earth to cover ledge; removal of stone and grading the whole surface of the grounds, including fertilizers and seeding of same; trimming and removal of trees; constructing carriage way, 128 feet of sea-beach gravel and 225 feet of broken granite; 21 feet of granite crossing between main building and laundry; granite crossings at two main entrances; building 860 feet of bank wall along the sea and 161 feet along the road; laying 1,118 feet of plank walk from navy-yard to main entrance of hospital grounds, 168 feet between road and hospital, and 52 feet around laundry. Improvements in boilers and machinery of engine-house: granite base for centrifugal clothes-wringer; electric telltale for water tank; gas-fixtures, window shades, water tank in attic, operating table, instrument cabinet, and a variety of miscellaneous improvements. The grounds have been inclosed by 462 feet of picket fence, including gateways, and 505 of wire fence; wire screens, 97 for windows and 3 for doors; lightning rods; a fire escape is in process of construction.

A pump and platform for well near road is needed; also an ice and tool house.

*Chelsea (Mass.) Naval Hospital.*—Many repairs and improvements have been made since the last report. The ceilings, walls of wards, rooms, and woodwork have been renovated and partly repainted, as also the surgeon's and assistant surgeon's quarters; engine room and laundry renovated; the old plan of wringing the clothes by hand or by a hand wringer has given place to a new steam extractor; new steam hood for hospital kitchen; roof of gate house repaired and chimney rebuilt; repairing and repainting window frames and sashes of hospital on the outside, and repairing and repainting brick and iron work on roof of hospital, gutters, and down spouts of same; new floors to three small wards in third story, repairs to landing of corridor, and repairing ceilings of the same. The old barn was so dilapidated that it has been pulled down and is being replaced by a shed for the reception of carts, plows, and other agricultural implements; repaired and repainted large barn, cemented floors, and replaced with new materials the horse and cow stalls of the same; repaired and retinned the grain bins of barn and stable; smoking room made more comfortable for patients and employes by partitioning off a room in the annex, utilizing the waste steam from the boiler room for heating purposes and for the conservatory, by leading it through a series of pipes some 150 feet to the back of the stable, and giving an exit into a blind drain, keeping the latter free from ice and snow in the winter season. The drainage has been generally satisfactory except in the vaults of the stable, low-lying grounds of the laundry, and pest house. The swampy condition of the laundry ground was removed by digging a blind drain, 2½ feet wide and 90 feet long, and varying in depth from 3 to 7 feet at base of the granite wall, so as to carry off the hill water to a lower level. The stable vault, for years a source of annoyance from the presence of water, at times from 2 to 3 feet deep, is now dry. Several systems had been tried during the past fifteen years, but were found

insufficient to keep out the water, supposed to come from a spring in the floor of the cellar, which would rapidly accumulate in wet weather. Medical Director Cleborne discovered that the so-called "spring" was nothing more than the surface water of the hill forcing its way through the unpointed blocks of the granite wall, and this supply was effectually cut off by a blind drain. The ground outside the stable was dug up for the space of 60 feet and a passage effected into and through the blocked-up main drain, which opened on the sea wall. The curve or angle (which caused the stoppage) was rounded off and the terracotta piping was laid to a point at which a new brick culvert, leading from cellar to piping, was built. The result has given a dry laundry ground, dry cellar, and dry stable. The granite wall and foundations of stable had been undermined by water, and these had to be raised by hydraulic jacks, the granite wall recemented, and extensive repairs to stable, such as new stalls, floors, joists, and sills.

The wash-shed has had its floor concreted, and a paint shop, carpenter shop, and seed room have been made out of rooms in the building. The pest house will be repainted and the sills and underpinning replaced. The plumbing has been thoroughly overhauled.

The chief repairs to be made are: The asphalt walk (leading from the main gate to the hospital) is badly cracked and has to be repaired; the brick area around the director's quarters has settled very much and needs grading and relaying; the large smokestack of the boiler house is in a bad condition at the top and will soon require repairs; the cobblestone courtyard has settled so as to serve as a reservoir for pools of water, and it should be raised, graded, and repaired; the hospital wharf and boat house will require early repairs.

The attention of the Bureau has been drawn to the present unsafe condition of the sea wall fronting the naval hospital. Temporary repairs can be made at a cost not exceeding the sum of \$30,000. To pull down and rebuild the wall, filling in and reclaiming 290,000 feet of land, would involve an approximate expenditure of \$211,000. At the proper time an estimate of this work will be submitted and Congress asked to appropriate the amount necessary for its execution.

*Boston (Mass.) Navy-Yard.*—The condition of the dispensary has not changed. Its situation, decayed structure, dampness, want of sufficient light, and noise of thoroughfare make it decidedly unfit for its purpose. It is again earnestly recommended that a building be erected expressly for this purpose in nearness to the workshops, where most of the accidents happen that require surgical aid, provided with rooms suitably equipped for their reception, and properly fitted for the first treatment of the sick and injured from the yard, and marines from the barracks. The Bureau of Yards and Docks has asked for an appropriation of \$12,500 to erect a building to comprise the dispensary, store-room, receiving and operating room, and the offices of the surgeon and assistant surgeon.

*Naval prison.*—It was completed during the latter part of November, 1887, being a part of the storehouse of the Bureau of Supplies and Accounts, and probably only intended originally as temporary; if otherwise it is difficult to understand the acceptance of a structure so unsuited in many respects for the intended purpose. It is located in the center of the navy-yard, thereby limiting the space by which it should be surrounded, and its nearness to other buildings on either side makes it comparatively dark. At one end of the building is a small "exercise yard," surrounded by a very high wooden inclosure 50 by 30 feet; but the steps from the prison so encroach upon the space that only a circle

of 25 feet in diameter is afforded, around which exercise by walking is taken. The prisoners now walk in the circle for an hour every day, except Saturday and Sunday. Saturday is excepted, it being bathing day, and all hands after bathing are given their bags and boxes to overhaul their clothing. No other work of any kind is done by the prisoners and no tools of any description are allowed. They are now exercised in two parties, one-half of the entire number in each, chained together in pairs. This exercise is taken in good weather in the circle, and in the corridors in bad weather. Tobacco, not to exceed a pound a month, is allowed for chewing only; no prisoner can smoke. A local missionary society supplies books and magazines, and a few of the prisoners subscribe to certain daily papers.

The prison interior has forty-two cells of 10 feet by 5 feet 11 inches floor area, and the height of the ceiling about 15 feet. The cells are in three parallel rows, two of which look out upon the windows, and the middle row looks out upon the dark passageway separating it from the outer row opposite; while the outer rows of cells are fairly well lighted, the inner row is quite dark. This difficulty is met by shifting the prisoners to other cells once a week, so that each one takes his turn in the dark cells. It may be said therefore that every prisoner spends one-third of his term of imprisonment in a cell too dark for the preservation of health. To correct this condition the inner row of cells should be removed; this, however, would reduce the capacity of the prison one-third. No provision is made for serious illness or the accommodation of prisoners with contagious or infectious disease, and the prison has no place where isolation could be effected. When the prison was arranged authority was asked and granted "to build up the space of two cells as one cell to provide for a prisoner who is taken sick." Serious cases have to be sent to the naval hospital at Chelsea, and an epidemic in the prison would effect a jail delivery. The capacity of the prison is 42. In July, 1889, there were 48 prisoners, which necessitated doubling the occupants of several cells. This continued for a few days, when the Department ordered the release of 9 men, thus depleting the prison sufficiently. At present (August) there are 32 prisoners. Of this number 1 is undergoing a sentence of five years, having completed over two years. The longest period during which one has remained in prison has been two years and three months out of a three year's sentence, and then the prisoner was pardoned.

A place could be properly equipped for the reception of sick prisoners, who can not be satisfactorily treated in the cells, if a portion of the same building, now occupied by paymaster's stores, was taken for the purpose.

Increased space for the "exercise yard" and acquirement of sufficient space in the building for the treatment of the sick are recommended. This should be done if the prison is to remain in its present locality. What, however, seems to be demanded is to change the locality of the prison and establish it where sanitary surroundings exist, where suitable labor will afford the requisite exercise and be found a healthy substitute for the present system of no labor and insufficient exercise, thereby creating an impaired vital condition and a constant unnecessary punishment.

*Newport (R. I.) Training Station.*—The barrack system should be adopted for the first period of instruction for boys who are preparing for the naval service. Badly lighted, ill-ventilated, low-decked, contracted ships give an unhygienic environment, and do not permit of sufficient exercise or work, nor warrant games and boyish amusements,

and if infected with dry or wet rot they are unfit for habitation. The quarters furnished by the gymnasium are sanitarily defective; the hammocks are strung on temporary frames, in two series, one above the other. The floor has no ventilated space underneath and is not made of tile or cement. In order to insure good health of body and mind, and prevent immoral tendencies and vices, all defects in quarters should, as far as practicable, be remedied.

It is earnestly recommended that an appropriation be asked for the erection of suitable barracks and appurtenances for the establishment of a permanent naval-apprentice system and station.

*Brooklyn, N. Y., Naval Hospital.*—Its fair condition has been well maintained. The repairs and improvements since the last report have been: Repaving the cobblestone roads; relaying flagstone floor in boiler house; repair of large platform scales in hospital grounds; covering old painted floors of a number of wards with strips of hard Georgia pine, 2 inches wide and one-half an inch thick, these being oiled and shellacked from time to time; laying new Georgia pine steps on three flights of stairs; awnings on south side of hospital; wire windows and door screens to all doors and windows of hospital building; large ice chest and refrigerating chamber; substitution of aseptic metallic handles on surgical instruments for old wooden and ivory ones.

A small brick outbuilding in the rear of medical director's residence has been erected for poultry use.

There have been changes and improvements in fitting up and furnishing quarters for medical officers in south wing of hospital and medical officers' mess room. A high board fence was erected by the city and the hospital between the market stables and the grounds of the director of the Naval Laboratory. The old wooden fence on the Wallabout Market line of the hospital property from stable to the new city line is insecure and will soon have to be removed; a wall should be built in its place.

The flooring of the coal shed has been renewed, and the roof repaired.

At present the old and worn-out bath tubs are being replaced by modern porcelain-lined baths without wooden fittings or casings.

The brick disinfection house with its boiler, kettle, and chamber is nearly ready for operation.

A small outbuilding is being erected for use as a paint room and storage of paints.

The unoccupied burial space in the cemetery is now sufficient for a few graves only. The cemetery can be enlarged by the addition of a portion of the adjacent grounds belonging to the residence of the director of the Naval Laboratory. It is recommended that the required tract be separated from the director's grounds by a high board fence, at an early date, and added to the cemetery.

The installation of the electric light in the hospital, laboratory, residences, outbuildings, and grounds will depend upon the condition of the appropriations.

*Naval Laboratory.*—The usual good administration has continued, and every emergency in the purveying and distributing service received satisfactory attention.

During the fiscal year ending June 30, 1892, 157 requisitions from ships and shore stations were filled and the supplies shipped to their various destinations. The total value of stores called for by these requisitions amounted to \$19,162.65.

At the laboratory repairs were made to ceilings, steam, gas, and water pipes, joints, traps, valves, unions, radiators, etc., repainting doors and vestibules.

At the director's residence repairs were made to ceilings, water tank, faucets, water-closets, and kitchen range; repapering five rooms and retouching paint work; repairs to water pipes and laundry stove; replastering parlor and library ceilings; repapering walls of parlor and library; repairs to roof, gas, steam, and water pipes; repainting doors and vestibules.

*Analytical Laboratory.*—Medical Inspector Brush reports that 136 samples were examined, of which 127 were accepted and 9 reported upon unfavorably.

The articles examined were acids, alcohol, borax, candles, chalk, glycerin, oils, paints, rubber hose, silk handkerchiefs, sugar, sirup, tallow, tobacco, vinegar, water, sulphate of zinc, and zinc.

A civilian chemist is now employed at the laboratory.

*Receiving Ship Vermont.*—A new bath tub, two new trapped closets, and a 10-foot locker for stationery and bedding, the top of which serves as a dressing table or counter in the sick bay; a new sink in the dispensary; 96 square feet added to the examining room on the port side of the sick bay, and the room immediately abaft the above enlarged to the extent of 22 square feet, are the alterations and improvements in the sick quarters of the ship.

*Philadelphia, Pa., Naval Hospital.*—Early in the fiscal year the annual repairs to boilers and heating apparatus were made; coal shed enlarged by extending the roof, and a cover built over fire room down to the shed; pointing of the chimney of the boiler house; repairing the cornice and plastering inside the main stack; resetting water-closets of the south ward and laying a marble floor; repairing hot-water boiler and hot-water pipes and replacing slop hopper with a new one; putting up rain conductors outside of dining room wall, capping old conductor and repairing leaks in roof; repairing range in main kitchen and putting in a new water back. The laundry has been renovated with new wooden floors in the ironing and drying rooms, new concrete floor in wash room, new sewer pipes, and its roof repaired. The new laundry machinery consists of two brass washers, one 64-inch steam mangle, four soapstone tubs, two cedar tubs, shafting, hangers, belting, etc., made by the Troy Laundry Company. The passageways throughout the building, the wards, and the greater number of the bed rooms have been painted, and the wire screens, supplied last year for 179 windows and 22 doorways, were greatly appreciated during the recent summer season.

In June the boilers were inspected by Chief Engineer Scot, U. S. Navy, and found to be in good order generally, but the brick walls which inclose them and form their flues were in a bad condition and likely to fall out. The old type steam pump was found not very efficient, and the addition of a modern pump suitable to the 16-horse power laundry boiler was recommended. Specifications were prepared and the proposal of Smith & Caldwell, of Philadelphia, for new masonry, furnace lining, dead plates, repairs to furnace fronts, radiator coils, steam and hot-water pipes, and a new fire pump, were accepted. The work is now nearing completion, and will be in readiness before cold weather.

*Annapolis, Md., Naval Academy.*—The water-closets for cadets are in a building detached from their quarters, and are kept in order with difficulty. The recommendation made in three former reports is re-



newed, for the erection of a suitable structure containing a system of approved closets, traps, and ventilators, and the old building destroyed.

*Washington, D. C., Naval Hospital.*—This hospital has been very thoroughly repaired and many substantial improvements made.

In June a contract was made with Blake & Williams, of New York, to replace the old hot-water apparatus with an entirely new low-pressure steam-heating fixture, consisting of direct and indirect radiating surfaces, boiler, piping, valves, and radiators complete and in working order in every respect. It was finished on the 1st of September.

A Loomis improved water-filter, agate lined, and with glass cylinders in wash-out pipes, was put in by B. F. Loomis, of Baltimore. It is connected with the main supply pipe from the city mains, and the entire building is now furnished with a full supply of filtered water. The capacity of the filter is 10 gallons per minute.

The exterior wood, brick, and iron work was scraped, cleaned, and painted, also exterior of stables, and the stalls relaid with heavy oak boards; slate and tin roof repaired. In the interior, walls painted, ceiling painted or kalsomined, dumb-waiter from basement to second floor, with speaking tube and whistle; electric bells from office to dispensary, apothecary's room, and basement. All woodwork varnished and gas fixtures bronzed; four water-closets replaced with new ones; two flushing tanks, three marble-top washstands, and two porcelain bathtubs, without casings; new floor in southeast ward; wainscoting bath-rooms in officers' quarters, west ward; two additional water backs put in kitchen range; smoke pipe of small boiler changed to chimney in boiler room; door made in place of window in boiler room, to facilitate the removal of ashes. In kitchen and mess room pantries, two soapstone sinks replaced with Mott tanks; one Mott grease trap in kitchen pantry, and wainscoting partly covered with tinned copper; one new iron bathtub with wooden rim; four galvanized iron hoods for cold-air inlets. The brick pavements of area way and kitchen laundry and store-room floors have been replaced with Neuchatel mastic, which is impervious to moisture, and a stucco retaining wall of Portland cement has been placed on wall of area way.

*Receiving-ship Dale.*—The dispensary has been entirely remodeled, and is now a commodious and an attractive feature of the ship. A new brig built on the berth deck, some distance from the eyes of the ship, giving a space with better light and ventilation, is another improvement.

*Norfolk, Va., Naval Hospital.*—In the summer of 1891 the Portsmouth and Suffolk Water Company, having supplied water to the hospital from Lake Kilby for one year, asked an increase of 50 per cent in price for the ensuing year. The wells that had not been used were cleaned out and made ready for use. These wells, with the cisterns in the court-yard, gave a good supply of water, with economy, until the drought in August and September; then a greater economy was required. During this period only ninety-two hundredths of an inch of rain fell. The Bureau then directed that driven wells should be made. The wells were a success, and in November the pumping into the cisterns, which at this time were nearly empty, began. The daily supply is 30,000 gallons of good potable water. A pump shed was built, and on solid foundations are now mounted the Snow duplex pump connected with the driven wells and a large Worthington pump, the latter a part of the fire protection.

A portion of the sea wall built a few years ago appeared to be sinking at a point near the causeway leading to the wharf. Thirty feet of

the wall had to be taken down and rebuilt. Pipes were placed in position to drain the low boggy land near the point where the wall was repaired.

In connection with the strengthening of the wall of the annex, Medical Inspector Penrose, in his annual report to the Bureau, makes the following statement:

In the annex, or the building which completes the west end of the quadrangle, in which water-closets, lavatory, and smoking rooms are situated, a serious crack was caused in the west wall by the great weight sustained by reason of the heavy iron water tanks in this building (14 feet in diameter and 7 feet in depth). Beds of concrete were put in 6 feet square and 3 feet deep, upon which were placed blocks of granite, and upon these were placed steel Z bar columns the height of each story, bolted together, forming continuous columns from the granite blocks to the 15-inch T beams, 50 pounds to the foot, placed immediately under and supporting the joists upon which the tanks rested. Two parallel lines of the T beams were used, one end let into the solid granite south wall of the annex building, resting upon iron-bearing plates, the other end supported by the two steel columns before mentioned.

The floor of the stable has been repaired and strengthened; old fence removed and replaced by a substantial fence. The system of fire protection is complete, with a good supply of water, with pressure sufficient to meet any emergency. By the method adopted the standpipe can be supplied with water by both the Worthington pump and Cameron pump in kitchen. These pumps can be worked separately or conjointly, and if necessary six streams of water of good volume may be concentrated upon a given point. Other work has been: Painting verandas of unused wing of hospital and iron fence, veranda and balconies at medical inspector's house, and the kitchen of surgeon's quarters at hospital; repairing pumps and pipes; repairing bridge spanning Gas House Creek; repairing sea wall; new boiler; old boilers thoroughly repaired for use in summer for laundry purposes or for pumping and whenever any repairs are needed upon the new boilers.

As soon as the funds will permit the inspector's quarters can be heated by steam from the hospital, which now has steam generation of greatly increased power.

The work of an electric light plant for the hospital was completed June 2, 1892, and connection made with the mains of the Citizen's Light, Heat, and Power Company, of Portsmouth, Va., for a constant current supply. Two hundred and four lamps were installed, and the lights are considered fully up to sixteen-candle power. The wiring for the grounds and the medical inspector's residence was completed September 20, 1892, and the connection made with the company's mains. In the grounds there are 12 lamps and in the residence 38.

*Pensacola, Fla., Naval Hospital.*—The surgeon's quarters and sick quarters at the old hospital ground have been repainted and refitted with well painted tin gutters, and where necessary replastered. A large cooking stove with utensils complete, and ten woven-wire mattresses and iron bedsteads have added greatly to the comfort, efficiency, and appearance of the sick quarters.

*Mare Island, Cal., Naval Hospital.*—During the past year the balconies of the hospital have been raised and painted; foundation of flagstaff renewed; entire basement, many rooms, and front of hospital painted; floors repaired; bathrooms repaired, ventilated, and floors covered with sheet lead; three new bathtubs put in position.

Medical Inspector Woods recommends the introduction of the electric light, the painting of the tin roof and replacing roof slates, the construction of one or more cells, new flooring of wards, renovation of inside blinds throughout the hospital, painting of all window sashes,



renewal of basement steps in front of hospital, new floor for dining room of patients, that of the employes' and portions of basement hall, renovation and painting of floors of all halls. The carriage shed demands extensive repairs, the stable requires painting, and the roads are in great want of an extensive top dressing. He recommends the grading of paths and graves, graveling of paths, and planting of trees and shrubs in the cemetery, "which should be converted into a national cemetery."

The Bureau has approved a requisition for wire, transformers, and poles necessary for the conduction of the electric current from the dynamo house at the navy-yard to the hospital inclosure, and proposals are awaited for the cost of the installation of the wire in the hospital, director's house, stable, and grounds.

A contract was made, after due advertisement, with J. B. McKenzie, of Benicia, Cal., for the construction of a residence for the medical director in charge of Naval Hospital for the sum of \$14,900. The contract was dated November 24, 1891, and all the work of said contract having been performed under the superintendence of Civil Engineer Maxson, it was accepted from October 1, 1892. From the reports received the Bureau expresses its entire approval of the satisfactory manner in which the contract was executed.

*Yokohama, Japan, Naval Hospital.*—Surgeon Rogers reports the following improvements and repairs to buildings and grounds of this hospital during the past fiscal year:

Roofs repaired from time to time, and are now being coal-tarred thoroughly; some of the rooms in main building repapered; ward walls kalsomined and colored; floors shellacked; matting put down in apothecary's quarters; new galvanized gutters and leads put upon buildings; kitchen floor and walls repaired and colored; veranda added to surgeon's quarters; new pump placed in well; iron gates placed at the front entrances and wooden gates at servants' or side entrances; electric fixtures to replace kerosene lamps.

All of the walks and driveway have been graded, drained, and covered with gravel or cinders. The area between the main and rear buildings has been graded, drained, and graveled, parked in its center, and ornamented with dwarf pines and shrubs. A brick walk has been laid down by the kitchen and from there to the apothecary's quarters. The buildings are being repainted and present a very creditable appearance. The grounds are in fine trim. A wahoo hedge has been planted along the front of the grounds, and in time will serve as fence and screen, both necessary. The rear veranda supports, sills, and part of the flooring have just been discovered to be in an advanced state of decay. This was hidden by the coating of paint. The posts and other parts are being replaced. When this is accomplished the building will be in excellent condition.

#### MUSEUM OF HYGIENE.

In the tenth annual report from the Museum of Hygiene the following points, brought out by Medical Director Philip S. Wales, are noted:

The need of a new building for the purposes of the institution is most urgent, not only on account of the defective adaptability of the one in present use for the grouping and display of the exhibit, but by reason of the limited space many important and interesting articles are necessarily relegated to the cellar and yard.

The register in which the exhibits are recorded accurately indicates the vicissitudes in the growth and progress of the institution.

In the year 1882 the number of exhibits received was 138; in 1883, 132; in 1884, 20; in 1885, 439; in 1886, 32; in 1887, 0; in 1888, 28; in 1889, 14; in 1890, 31; in 1891, 122; and in 1892, 605.

The greater part of the exhibits on hand during the first four years were purchased by the Bureau, those of the remaining years were contributed by friends, the only expense incurred by the Bureau being that of transportation. An increase in the growth of the institution proportionate to the increase in the last few years, which is most probable, will make the Museum of Hygiene a mere storehouse for hygienic exhibits. This most strongly demonstrates the need of a new building, as such a condition of affairs would destroy the usefulness of this important factor in hygienic instruction.

Of the similar institutions in the world, the other two being located respectively in London and Berlin, this is the leading one as regards capabilities of indefinite expansion into a center of practical and scientific teaching. The foreign museums are supported by both national and private contributions, while this one since its first appropriation in 1882 has had no governmental aid accorded it, and its present value is due in great part to the private enterprise of those interested in its success.

The official application for the vacant buildings of the Naval Observatory having failed of success, and as there is at present no available public building to be obtained for the purposes of the institution, it is suggested that in the next annual estimate of appropriations, Congress be asked for \$100,000 for the erection of a suitable building on some portion of the public grounds near the Army Medical Museum.

A catalogue of the exhibits of the museum has been completed and will be issued at an early date; it is believed and hoped that its appearance will stimulate the efforts of the friends of the institution in its behalf, and that by indicating the deficiencies existing in many classes of objects, attempts will be made to supply them.

The preparation of a catalogue of the library is being continued, and will be pushed forward until completed. Owing to the fact that no large purchases of books have been made for several years, it is believed that the value of the library would be greatly enhanced, should this deficiency be supplied, at least in the direction of bacteriological and hygienic publications. During the last year 1,939 volumes, mostly official reports, have been received and 399 volumes bound neatly and durably. There are at present 12,010 volumes in the library.

Bacteriological examinations of the water of the Potomac have been made and the different organisms photographed. There is great need of a new photo camera and microscope, the one in present use being imperfect and antiquated.

It is recommended that a course of popular lectures, by competent men, on subjects pertaining to sanitary science, be delivered at this institution, as is done abroad, where much attention and praise is accorded them.

The increase of the salary of the chemist to \$1,500 is most urgently recommended.

#### VACANCIES IN THE MEDICAL CORPS.

There are at present two vacancies in the Medical Corps, and it is confidently anticipated that the existing vacancies will be filled before the close of the year. The medical board continues in session at the naval hospital, New York.

## DELEGATES.

In October, 1891, Surgeon Howard E. Ames was appointed delegate to represent the Medical Department of the Navy at a meeting of the American Public Health Association, held at Kansas City, Mo.

Medical Director Bloodgood and Surgeon Siegfried were appointed delegates to the American Medical Association, which met at Detroit, Mich., in June, 1892.

## YELLOW FEVER.

The naval service has been exempt, during the year 1891, from an outbreak of yellow fever; not a case has been reported from any of the vessels on the home or foreign stations.

## CHOLERA.

This much dreaded scourge, recently a cause of much anxiety throughout the country, did not make its appearance upon any of the vessels of the Navy during the year 1891.

## SMALLPOX.

Seven cases of smallpox, one terminating fatally, were reported during the year, 1891; they all occurred on vessels on the Asiatic station, two on the *Alliance*, one on the *Marion*, and four on the *Omaha*.

## MEASLES.

Twenty-nine cases of measles were reported during the year on board of the following vessels; two on the *Baltimore* that were returned to duty in twelve days, and without a further spread of the disease. Ten cases occurred on the *Chicago*, nine of them being transferred to the naval hospital at Norfolk, and one returned to duty. Two cases on the *Essex*, one was sent to hospital and the other returned to duty. One case occurred on the *Michigan*; the patient was removed to his home on shore and the infection of the crew was avoided. There were five cases on board of the *Monongahela*, and in order to prevent a further spread of the disease among the crew, they were sent to hospital and the ship thoroughly disinfected. Eight cases occurred on the *Newark*. They were removed the same day to the Norfolk hospital and there was no further spread of the disease. One case occurred on the *Wabash*.

## INFLUENZA (LA GRIPPE).

The total number of cases of this disease reported from the force afloat (including receiving ships) for the year was five hundred and twelve, very little more than half the number (nine hundred and thirty-five) reported for the previous year. The average number of days each case remained under treatment was the same (5+). There were three deaths, which was a very small percentage of the whole number under treatment, and occurring in those whose cases were complicated.

## BERI BERI.

The five cases received into the naval hospital, Brooklyn, N. Y., in November, 1890, from the Brazilian cruiser *Guanabara* were discharged from the hospital January 27, 1891, and were taken charge of by the Brazilian consul in New York.

## PENSION CASES.

Number of pension cases remaining on hand June 30, 1891 .....	4
Number received during fiscal year ending June 30, 1892 .....	1,707
Number answered during fiscal year ending June 30, 1892 .....	1,692
Number remaining on hand June 30, 1892 .....	19

MICROSCOPIC OUTFITS TO HOSPITALS, REVISION OF SUPPLY TABLE,  
ETC.

During the last few years bacteriology has assumed such prominence that the determination of the nature of the organisms of which it treats has become almost indispensable to scientific medical diagnosis.

In order that the naval service should possess the most approved means for the determination of these and other elements of disease, complete microscopical outfits of the most modern and perfect make have been supplied the naval hospitals at New York, Philadelphia, and Norfolk, and it is the intention of the Bureau to equip the other hospitals in a similar manner as soon as it may be expedient.

A revision of the supply table was rendered necessary, owing to the large number, of new drugs which have within the past few years been recognized as indispensable to the general practitioner.

This revision, however, has been accomplished without causing radical innovations in the systematic arrangement of the supply table recently in use, and only those drugs of undoubted usefulness and established reputation have been introduced.

Provision is made in the new supply table for a more liberal allowance of medicines to ships having a smaller complement of men.

The former manual to accompany the urinary and water case has also been revised and simplified, in order that it may be more suited to the needs of such analyses when performed on board ship.

The antiseptic outfit has likewise been revised, and such agents as have from thorough and continued trial proven themselves useful have been added.

For many years the Bureau has desired to rebind the medical journals, which were sent in during the war, and at periods antedating, and which from long and hard usage were almost falling to pieces, thus imperiling the preservation of these valuable records. Only recently, however, has success attended these efforts, and as a result the old torn and uneven covers have been replaced by neat and uniform bindings, adding to the appearance as well as the protection of the collection.

PROPOSED CHANGES IN THE EXAMINATION FOR ADMISSION INTO THE  
MEDICAL CORPS OF THE NAVY.

It is the intention of the Bureau to enlarge the scope of the professional examination of candidates for admission and promotion, the advance of medical science necessitating the introduction of subjects now most important factors in medical education but receiving little consideration a few years ago.

In order to thoroughly comprehend the subject-matter of such studies as bacteriology, pathology, physiological actions of drugs, and the scientific application of the principles of hygiene and quarantine, more extended knowledge of botany, geology, zoölogy, and physics is required; consequently a greater knowledge of these branches will be exacted than heretofore.

This revision is not proposed with the view of increasing the difficulty of entrance for the well-informed candidate, but to eliminate the possibility of the admission of those not thoroughly grounded in professional knowledge.

#### REPORTS ON TRITURATES AND COMPRESSED TABLETS.

In order to determine the efficacy and suitability of the triturate and compressed tablet forms of medication, numerous drugs prepared in this way were distributed among the naval vessels in 1890, and a report as to the effects of moisture and climate upon them required.

After an extended trial on board the *Portsmouth* in the West Indies, the *Essex* in the South Atlantic, and the *Baltimore* in the South Pacific, the medical officers of these ships, without an exception, highly recommended their adoption on account of their adaptability to the requirements of the service.

Among the arguments advanced in support of their recommendations the following may be noted:

(1) Their compact form makes them especially suited to conditions where small space is a leading consideration.

(2) Their exact proportions peculiarly recommend them on account of the great difficulty of accurate pharmaceutical compounding on board ship, and the liability of mistakes on the part of the dispenser is reduced to a minimum.

(3) By reason of their unalterability when exposed to moisture or vicissitudes of climate.

(4) From their possessing the advantage of being available for immediate use in cases of necessity.

(5) The therapeutical effects, which equaled and in many of the preparations surpassed those obtained from other forms of the same drug (probably attributable to the more perfect incorporation and exact proportion of their constituents).

During the latter part of 1891 these preparations were sent to the various naval hospitals, and after a thorough trial, extending over six months, reports were received which may be summarized as follows:

*Naval Hospital, Chelsea.*—Varying success has attended their use; generally reliable; at times, however, it is necessary to resort to liquid preparations. Some, especially that of eunonymin, when exposed to heat and moisture become soft and sticky, running together in the box in which they are dispensed. The triturates of the tinctures are highly recommended on account of the preclusion of alcoholic evaporation.

*Naval Hospital, New York.*—With very few exceptions this form of preparation is as effective as any other. The triturates are apparently peculiarly adapted to use on board ship. Their solubility diminishes with age.

*Naval Hospital, Philadelphia.*—The triturates are convenient and efficient forms of medication, especially suited to the naval service. The tablets of the analgesics and antipyretics are unreliable, probably on account of their defective solubility, as they give satisfactory results when pulverized.

*Naval Hospital, Washington.*—The compressed tablet triturates are accurate in dose, prompt and efficient in therapeutic action, and most convenient in form. In addition, they are less liable to deterioration than other preparations of the same drugs, provided the bottles be kept well corked.

*Naval Hospital, Norfolk.*—They are convenient and efficient, except phenacetin. Time and climatic influences do not seem to affect them.

*Naval Hospital, Mare Island.*—Are regarded as efficient. An objection is that they may require preliminary solution, in order to produce their physiological effects, or to prevent irritation. They are easy and perfect of preservation. They, however, do not allow of the making of combinations of drugs.

More recent reports confirm those previously received in regard to their efficacy.

In an official communication to the Bureau under date of October 1, 1892, Medical Inspector W. K. Van Reyphen, fleet surgeon of the Pacific station, alludes to their employment in the following commendatory terms:

The use of tablets and tablet triturates has been exclusive, whenever possible. I commend them highly. They are convenient, effective, and economical. None of them show any signs of deterioration. Four tablets of cathartic Comp. Imp. are required as a substitute for three Pil. Cath. Comp. The others are quite as effective as when administered in other forms.

By reason of the extremely favorable reports received a number of drugs have been replaced by triturates in the new supply table, and in the cases of very important drugs the usual pharmaceutical preparations have been retained in addition to the triturates.

#### PRECAUTIONS AGAINST CHOLERA.

With the view of being fully prepared to deal with cholera, in case its appearance in this country should necessitate such action, a letter was addressed to the medical officer in charge of the Naval Hospital, Widows Island, directing him to immediately report to the Bureau any deficiencies which might exist in the equipment of the institution, and to have in readiness every detail necessary for the administration of the hospital in such an emergency.

In addition, letters were addressed to the commandants of all stations requesting them to direct the medical officers under their command to make thorough and rigid sanitary inspections of such stations, and to forward a report on the same to the Bureau, these inspections to include all drains, sewers, and the like.

As a result, information was received as to all existing sanitary defects, together with measures which would remedy such conditions.

Invariably, except where extensive alterations in the sewerage systems were recommended, measures were immediately instituted by which the sanitary conditions were made as perfect as possible.

Moreover a circular was prepared on the treatment and prophylaxis of cholera, in which particular attention was directed to the method of inoculation as performed by Ferran, complete directions being given for the preparation and inoculation of the cholera vaccine.

Prophylactic measures were considered under three heads: (1) General precautions, applying to shore stations as well as to ships. (2) Personal precautions. (3) Precautions to be observed in the sick quarters, and under the latter clause were discussed the best methods for the disinfection of choleraic discharges and the disposal of the dead.

#### ENLISTMENTS.

The number of persons examined for the naval service during the year 1891 was 11,252. Of this number 4,160 were rejected for physical disqualifications, or 369.71 per thousand.

During the previous year 9,834 were examined and 3,620 rejected, or 368.11 per thousand, the ratio of rejections being practically the same

#### COLOR PERCEPTION.

The number of rejections on account of color blindness was 198 in 11,252 persons examined, or 17.59 per thousand, a much higher proportion than the previous year, when it was only 10.44 per thousand.

## SICK OF THE NAVY.

The number of patients admitted to the sick list and under treatment during the year 1891, was 12,151, a decrease of 698, as compared with the previous year, when it was 12,849.

The sick were distributed as follows: 7,934 on vessels afloat and receiving ships, 1,733 in hospitals, and 2,484 at navy-yards and stations.

The daily average number of sick on vessels afloat and receiving ships was 162.29, which was practically the same as the previous year when it was 161.86. The average number of days each case was under treatment was 7.46, while the previous year the average was 6.86 days.

The total number of sick days of the force afloat and on receiving ships, represented a loss to the Government of 59,237 days, or an average of 162.29 men on the sick list daily. Of the 7,934 patients on the sick list 6,968 were returned to duty, 727 were invalided to hospitals, 46 were discharged from the service, 41 died, and 152 continued under treatment at the close of the year.

## MORTUARY RECORD.

The number of deaths in the entire Navy during the year 1891 was 91, distributed as follows: Thirty-four in the hospitals, 16 at the yards and stations, and 41 on vessels afloat and on receiving ships, making a ratio of 7.91 in a thousand. These figures, as compared with previous years, show a very gratifying result, being the lowest death rate in the Navy for many years, and which can be attributed to the absence throughout the year of casualties and epidemic diseases.

The death rate for the year 1888 was 12; for 1889, 18; for 1890, 9; and for 1891, 7.

The death rate of the force afloat and on receiving ships was 4.67 in a thousand, practically the same as that of last year, 4.20 in a thousand (which rate is far below the average, as shown by the actuary tables of mortality).

## INSANE OF THE NAVY.

There were 96 patients belonging to the Navy under treatment in the Government Hospital for the Insane, in the District of Columbia, during the year ending September 30, 1892:

Number remaining in hospital September 30, 1891 . . . . .	76
Number admitted during the year ending September 30, 1892 . . . . .	20
<b>Total number under treatment . . . . .</b>	<b>96</b>
<b>Number discharged during year ending September 30, 1892:</b>	
Recovered . . . . .	7
Improved . . . . .	1
Unimproved . . . . .	2
Died . . . . .	11
	<b>21</b>
<b>Number remaining September 30, 1892:</b>	
Officers . . . . .	6
Petty officers, enlisted men, and marines . . . . .	69
<b>Total . . . . .</b>	<b>75</b>

## NAVAL HOSPITAL FUND.

The condition of this fund is as follows, viz:

Balance on hand September 30, 1891 .....	\$243, 765. 21
Transferred to the credit since September 30, 1891 .....	196, 630. 98
Credit by appropriation, act of July 19, 1892 .....	20, 000. 00
	<hr/>
	460, 396. 19
Expended since September 30, 1891 .....	105, 349. 11
	<hr/>
Balance on hand September 30, 1892 .....	355, 047. 08

I submit tabular statements of sick, etc., compiled from reports of sick from the different naval stations within the United States and from vessels on home and foreign stations, for the year 1891.

Very respectfully, your obedient servant,

JNO. MILLS BROWNE,  
*Surgeon-General, U. S. Navy.*

Hon. B. F. TRACY,  
*Secretary of the Navy.*



*Estimate of appropriations required for the service of the fiscal year ending June 30, 1896,  
by the Bureau of Medicine and Surgery, Navy Department.*

Detailed objects of expenditure, and all explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1895.
<b>SALARIES.</b>			
Chief clerk (appropriated act of July 16, 1892).....	\$1,800.00		
One clerk of class 1 (same act).....	1,000.00		
Two clerks of class 2 (same act).....	2,800.00		
Two clerks of class 1 (same act).....	2,400.00		
One clerk (same act).....	2,000.00		
One assistant messenger (same act).....	720.00		
One laborer (same act).....	600.00		
One janitor for naval dispensary (same act).....	600.00		
One laborer for naval dispensary (same act).....	480.00		
		\$12,000.00	\$12,000.00
<b>MEDICAL DEPARTMENT.</b>			
For surgeons' necessities for vessels in commission, navy-yards, naval stations, Marine Corps, and Coast Survey, and for the civil establishment at the several naval hospitals, navy-yards, Naval Laboratory, Museum of Hygiene, and Naval Academy. (Appropriated act of July 19, 1892).....		90,000.00	55,000.00
<b>NAVAL HOSPITAL FUND.</b>			
For maintenance of the naval hospitals at the various navy-yards and stations, and for care and maintenance of patients in other hospitals at home and abroad. (Appropriated act of July 19, 1892).....		20,000.00	20,000.00
<b>CONTINGENT.</b>			
For freight, expressage on medical stores, tolls, ferriages, transportation of sick to hospitals, transportation of insane patients; care, transportation, and burial of the dead; advertising; telegraphing; rent of telephones; purchase of books and stationery; binding of unbound books and pamphlets; postage and purchase of stamps for foreign service; expenses attending the medical board of examiners; rent of rooms for naval dispensary and Museum of Hygiene; hygienic and sanitary investigation and illustration; sanitary and hygienic instruction; purchase and repair of wagons and harness; purchase of, and feed for horses and cows; trees, plants, garden tools and seeds; furniture and incidental articles for the Museum of Hygiene, naval dispensary, Washington, naval laboratory, sick quarters at Naval Academy and marine barracks, surgeons' offices and dispensaries at navy-yards and naval stations; washing for medical department at Museum of Hygiene, naval dispensary, Washington; naval laboratory, sick quarters at Naval Academy and marine barracks, dispensaries at navy-yards, and naval stations, and ships, and rendezvous, and all other necessary contingent expenses. (Appropriated act of July 19, 1892).....		25,000.00	25,000.00
<b>REPAIRS.</b>			
For necessary repairs of naval laboratory, naval hospitals and appendages, including roads, wharves, outhouses, sidewalks, fences, gardens, farms, and cemeteries. (Appropriated act of July 19, 1892).....		20,000.00	20,000.00

*Force afloat—General aggregate, 1891.*

Classification of diseases.	Remaining from last year.	Admitted.	Discharged to duty.	Invalided.		Died.	Remaining at the end of the year.	Total number of sick days.
				To hospital.	From service.			
Morbid states and processes irrespective of parts affected.	2	96	81	9	3	2	3	930
General diseases dependent upon morbid poisons:								
Class 1	30	859	780	84	1	7	17	5,155
Class 2	4	424	382	38		1	7	2,417
Class 3	2	10	6	6				106
Class 4	5	356	280	67	7		7	4,308
Dependent upon causes other than morbid poisons:								
Class 1		74	63	7	2		2	517
Class 2		156	139	15			2	458
Developmental diseases	2	5	1	2	4			49
Unclassified diseases	7	606	516	66			11	5,499
Local diseases:								
Diseases of the nervous system	2	344	285	41	10	2	8	2,055
Diseases of the eye	1	106	90	15	1		1	1,032
Diseases of the ear		34	29	5				217
Diseases of the nose		11	9	1			1	23
Diseases of the circulatory system	1	43	22	14	4	3	1	325
Diseases of the respiratory system	28	782	696	100	2	2	10	5,206
Diseases of the digestive system	10	1,104	1,059	44	2	2	7	4,901
Diseases of the lymphatic system	5	220	175	32			18	4,372
Diseases of the urinary system		73	46	22	1	3	1	680
Diseases of the generative system	7	287	248	31	2		13	3,495
Diseases of the locomotor system	1	42	36	7				553
Diseases of the integumentary system	6	654	624	22	1		19	4,927
Parasitic diseases		1	1					1
Poisons		16	16					127
Tumors and cysts, malignant or nonmalignant		14	12	1		1		135
Surgical operations		6	6					131
Injuries, etc	29	1,469	1,366	78	6	18	30	11,625
Total	142	7,792	6,968	727	46	41	152	50,237

*Force afloat—Detailed statement, 1891.*

Diseases.	Remaining from last year.	Admitted.	Discharged to duty.	Invalided.		Died.	Continued to next year.	Total number of sick days.
				To hospital.	From service.			
MORBID STATES AND PROCESSES IRRESPECTIVE OF PARTS AFFECTED.								
Adynamia	2	86	79	4	3		2	710
Atrophy		12		2				16
Cellulitis		1	1					13
Tuberculosis		7	1	3		2	1	192
GENERAL DISEASES, DEPENDENT UPON MORBID POISONS.								
Class 1.								
Catarrhus epidemics	22	487	468	26	1	3	11	2,652
Denguis		1	1					3
Diarrhea epidemica		4	4					21
Dysentery acuta		13	10	3				151
Dysentery chronica		3	1	2				35
Febricula		5	3					40
Febris continua simplex	12	201	186	14			3	1,091
Febris enterica	5	12	10	8		3	1	336
Febris typho-malarialis		4	1	1			2	22
Morbilli		29	5	24				152

## Force afloat—Detailed statement, 1891—Continued.

Diseases.	Remaining from last year.	Admitted.	Discharged duty.	Invalided.		Died.	Continued to next year.	Total number of sick days.
				To hospital.	From service.			
GENERAL DISEASES DEPENDENT UPON MORBID POISONS—continued.								
Class 1—Continued.								
Parotitis.....		3	3					30
Scarlatina.....		8	8					79
Vaccina.....	1	77	78					510
Varicella.....		7	2	4		1		93
Class 2.								
Cachexia malarialis.....		7	6	1				27
Febris intermittens.....	4	295	286	10			3	1,371
Febris remittens.....		122	90	27		1	4	1,019
Class 3.								
Erysipelas.....	1	10	5	6				105
Septicæmia.....	1		1					1
Class 4.								
Gonorrhœa.....	2	172	155	14	1		4	1,953
Syphilis primitiva.....	1	60	46	13			2	693
Syphilis consecutiva.....	2	124	79	40	6		1	1,662
GENERAL DISEASES, DEPENDENT UPON CAUSES OTHER THAN MORBID POISONS.								
Class 1.								
Accid. effectus.....		26	24	2				236
Caloris effectus.....		33	31				2	127
Frigoris effectus.....		15	8	5	2			144
Class 2.								
Alcoholismus.....		155	138	15			2	497
Scorbutus.....		1	1					31
DEVELOPMENTAL DISEASES.								
Senectus.....	2	5	1	2	4			46
UNCLASSIFIED DISEASES.								
Anæmia.....		8	4	4				88
Diabetes.....		5	5					14
Lumbago.....		8	7				1	64
Myalgia.....		2	1	1				3
Opium habit.....		1	1					1
Podagra.....	1	8	9					70
Rheumatismus.....	5	472	416	61		6		3,795
Rheumatismus acutus.....	1	92	71	18		4		1,284
Rheumatismus chronicus.....		6	4	2				98
Rheumatismus gonorrhœica.....		1	1					35
Scrofula.....		1	1					15
Torticollis.....		2	2					
LOCAL DISEASES.								
Diseases of the nervous system.								
Apoplexia.....	1			1				27
Asphyxia.....		1		1				1
Cephalalgia.....		61	59	1			1	262
Chorea.....		2	2					11
Convulsio.....		14	10	4				62
Dementia.....		7	2	3	1		1	25
Encephalitis.....		3	2			1		27
Epilepsia.....		21	13	5	3			142
Insolatio.....		3	1	2				11
Insomnia.....		3	2	1				6
Imbecillitas.....		1		1				1
Mania.....		7		6	1			74

## Force afloat—Detailed statement, 1891—Continued.

Diseases.	Remaining from last year.	Admitted.	Discharged to duty.	Invalided.		Died.	Continued to next year.	Total number of sick days.
				To hospital.	From service.			
LOCAL DISEASES—continued.								
<i>Diseases of the nervous system—Continued.</i>								
Mania a potu .....		1	1					4
Melancholia .....		11	6	4	1			911
Myelitis .....		1	1					6
Nausea marina .....		54	53				1	175
Neuralgia .....	1	103	99	3	1		1	585
Neurasthenia .....		13	9	3			1	119
Neuritis .....		3	2	1				47
Paralysis .....		8	2	2	1	1	2	157
Rachialgia .....		1	1					2
Sciatica .....		6	4	2				111
Vertigo .....		20	16	1	2		1	89
<i>Diseases of the eye.</i>								
Achromatopsia .....		1	1					2
Amaurosis .....		3	3					33
Asthenopia .....		3	2		1			121
Blepharitis .....		2	2					15
Cataracta .....		1		1				1
Conjunctivitis .....		67	61	5			1	490
Hypermetropia .....		3	1	2				8
Hordeolum .....		2	2					6
Iritis .....		8	7	1				123
Keratitis .....		3	3					20
Nyctalopia .....		1	1					2
Ophthalmia .....		2		2				57
Retinitis .....		3	2	1				29
Scleritis .....		2	2					34
Ulcus corneæ .....	1	5	3	3				161
<i>Diseases of the ear.</i>								
Otalgia .....		2	2					3
Otitis .....		24	19	5				188
Otorrhœa .....		7	7					25
Surditas .....		1	1					1
<i>Diseases of the nose.</i>								
Catarrhus nasalis .....		9	8	1				28
Epistaxis .....		1					1	2
Ozœna .....		1	1					3
<i>Diseases of the circulatory system.</i>								
Aneurysma .....		2		1		1		5
Angina pectoris .....		6	3	2		1		31
Anasarca .....		1		1				1
Abscessus pericardii .....		1				1		1
Hypertrophica cordis .....		6	1	3	2			79
Morbi valvularum cordis .....		6	3	1	1		1	28
Oedema .....		1	1					3
Palpitatio .....	1	16	11	5	1			143
Phlebitis .....		2	2					34
Syncope .....		1	1					1
Varix .....		1		1				1
<i>Diseases of the respiratory system.</i>								
Asthma .....		9	5	4				41
Bronchitis acuta .....	13	232	220	21			4	1,771
Bronchitis chronica .....	1	41	30	12				367
Bronchorrhagia .....		1	1					1
Catarrhus .....	11	332	340	2			1	1,453
Emphysema .....		1		1				1
Hæmoptysis .....		10	8	2				75
Laryngitis .....	1	37	36	2				176
Phthisis pneumonica acuta .....		5	1	2			2	41
Phthisis pneumonica chronica .....		30	7	20	2	1		304
Pleuritis .....		33	25	6			2	430
Pleurodynia .....		3	3					25
Pneumonia .....	2	48	20	28		1	1	514

Force afloat—Detailed statement, 1891—Continued.

Diseases.	Remaining from last year.	Admitted.	to Discharged duty.	Invalided.		Died.	Continued to next year.	Total number of sick days.
				To hospital.	From service.			
LOCAL DISEASES—continued.								
<i>Diseases of the digestive system.</i>								
Caries dentium		4	4					11
Odontalgia		5	5					7
Parulis		4	3	1				15
Ascites		1	1					5
Cholera morbus		49	48	1				128
Colica	1	73	71	3				181
Constipation		34	33	1				93
Congestio hepatis		13	13					102
Cirrhosis hepatis		1		1				7
Dyspepsia		45	38	5	1		1	250
Diarrhoea acuta	2	325	322	4			1	1,266
Diarrhoea chronica		8	7				1	31
Enteritis		3	3					40
Fistula in ano		7	2	5				157
Fissura in ano		2	2					11
Gastritis		31	24	6	1			177
Gastrodynia		8	7					27
Hæmatemesis		1		1				2
Hæmorrhoids		34	30	4				179
Hepatitis acuta		1		1				17
Hepatitis chronica		2	2					10
Icterus		16	15	1				131
Nausea		1	1					2
Peritonitis		2				2		14
Pharyngitis		46	45	1				165
Prolapsus ani		1	1					3
Rhagades ani		5	3	2				48
Stomatitis		3	3					7
Tonsillitis	7	372	370	5			4	1,734
Typhlitis		7	6	1				81
<i>Diseases of the lymphatic system.</i>								
Adenitis	5	214	172	29			18	4,329
Bubo		1		1				4
Lymphangitis		5	3	2				39
<i>Diseases of the urinary system.</i>								
Albuminuria		3	1	1	1			68
Calculus		2	2					5
Cystitis		32	24	7		1		400
Dysuria		5	3	2				6
Enuresis		12	6	6				67
Hæmaturia		2	2					8
Nephritis		17	8	6		2	1	106
<i>Diseases of the generative system.</i>								
Balanitis		8	7				1	53
Chancroides		81	67	11			3	1,215
Epididymitis	1	24	22	1			2	290
Hydrocele		4	1	3				4
Oorchitis	6	127	120	7			6	1,578
Paraphimosis		1					1	3
Phymosis		6						50
Prostatitis		1	1					2
Testitis		1	1					13
Urethra strictum		24	16	8				128
Urethritis		6	6		1			34
Varicocele		4	2	1	1			125
<i>Diseases of the locomotor system.</i>								
Ankylosis	1	3	2	2				19
Arthritis		4	3	1				23
Bursitis		3	3					25
Ostitis		1	1					9
Periostitis		11	8	3				242
Pes valgus		2	2					30
Synovitis		18	17	1				196

## Force afloat—Detailed statement, 1891—Continued.

Diseases.	Remaining from last year.	Admitted.	Discharged to duty.	Invalided.		Died.	Continued to next year.	Total number of sick days.
				To hospital.	From service.			
LOCAL DISEASES—continued.								
<i>Diseases of the integumentary system.</i>								
Abcessus.....	2	245	234	8			5	1,722
Cellulitis.....		1	1					1
Anthrax.....		9	8	1				123
Clavus.....		5	4	1				47
Dermatitis.....		3	3					6
Ecthyma.....		2	2					27
Eczema.....	1	23	21	2			1	246
Erythema.....		5	5					27
Furunculul.....	1	213	209				5	1,170
Herpes.....		10	10					61
Hyperidrosis.....		1			1			26
Impetigo.....		3	2	1				4
Lichen.....		3	3					12
Onychia.....		13	13					126
Paronychia.....	1	20	19	1			1	171
Pedunculosis.....		1	1					5
Pemphigus.....		1	1					12
Psoriasis.....		1	1					5
Scabies.....		7	6	1				44
Seborrhoea.....		1	1					8
Sinus.....		1	1					10
Sycosis.....		2	2					15
Tinea.....		3	3					30
Ulcus.....	1	70	63	7			1	619
Unguis involutus.....		5	5					122
Urticaria.....		3	3					9
Verruca.....		3	3					30
PARASITIC DISEASES.								
Vermes.....		1	1					1
POISONS.								
Poisoning (croton oil).....		4	4					13
Valnus venenatum.....		12	12					115
TUMORS AND CYSTS (MALIGNANT OR NONMALIGNANT.)								
Cystis.....		6	6					83
Hæmatoma.....		3	2	1				24
Throma.....		2	2					17
Lipoma.....		1	1					7
Ranula.....		1	1					2
Sarcoma.....		1				1		2
SURGICAL OPERATIONS.								
Amputatio.....		5	5					127
Operation for ptosis.....		1	1					4
INJURIES, ETC.								
Abrasio.....	2	57	57				2	449
Ambustio.....	2	106	90	9	1	2	6	908
Concussio.....		12	10	1		1		40
Contusio.....	6	368	364	4			6	2,240
Fractura.....	2	67	42	19		3	5	1,342
Hernia.....	2	44	25	18	2		1	319
Luxatio.....		15	11	1				146
Stremma.....	5	304	303	6				1,909
Submersio.....		8	1			7		9
Valnus contusum.....	4	155	148	6	2		3	1,130
Valnus incisum.....	4	137	133	4		2	2	1,189
Valnus laceratum.....	1	150	140	5		1	5	1,529
Valnus punctum.....		35	33	2				224
Valnus sclopetarium.....	1	9	4	3	1	2		85
Ruptured muscle.....		1	1					10
Ruptura lig. deltoid.....		1	1					6
Total.....	142	7,792	6,908	727	46	41	162	59,237

## Navy-yards and stations—General aggregate, 1891.

Classification of diseases.	Remaining from last year.	Admitted.	Discharged to duty.	Invalided.		Died.	Remaining at the end of the year.	Total number of sick days.
				To hospital.	From service.			
Morbid states and processes irrespective of parts affected.....		31	26	3		1	1	126
General diseases—dependent upon morbid poisons:								
Class 1.....	1	424	360	24			41	2,213
Class 2.....	1	87	81	7				453
Class 3.....		3	2	1				10
Class 4.....	1	65	31	34			1	423
Dependent upon causes other than morbid poisons:								
Class 1.....		2	1	1				7
Class 2.....		36	31	4	1			105
Unclassified diseases.....	2	129	114	15	2			1,009
Local diseases:								
Diseases of the nervous system.....	5	158	142	17	1	1	2	738
Diseases of the eye.....	1	48	43	5			1	323
Diseases of the ear.....	1	18	15	3	1			71
Diseases of the nose.....		2		1			1	3
Diseases of the circulatory system.....	2	23	11	7		6	1	181
Diseases of the respiratory system.....	7	437	397	39		2	6	2,585
Diseases of the digestive system.....	8	508	532	34	1	1	8	2,109
Diseases of the lymphatic system.....		17	10	7				149
Diseases of the urinary system.....	1	23	11	7	2	3	1	252
Diseases of the generative system.....	1	29	18	12				236
Diseases of the locomotor system.....		2	1	1				3
Diseases of the integumentary system.....	2	106	96	12				694
Poisons.....		4	4					32
Tumors and cysts—malignant or nonmalignant.....		5	3	1		1		158
Injuries, etc.....	3	231	212	20		1	1	1,226
Total.....	*36	2,448	2,141	255	8	16	64	13,106

\* The report for 1891 shows 47 patients remaining on the sick list at the close of the year. The apparent discrepancy is due to the transfer of 11 cases remaining, from the navy-yard to the hospital at Portsmouth, N. H., making 36 cases.

## Navy-yards and stations—Detailed statement, 1891.

Diseases.	Remaining from last year.	Admitted.	Discharged to duty.	Invalided.		Died.	Continued to next year.	Total number of sick days.
				To hospital.	From service.			
<b>MORBID STATES AND PROCESSES IRRESPECTIVE OF PARTS AFFECTED.</b>								
Adynamia.....		30	25	3		1	1	123
Hemorrhagia.....		1	1					3
<b>GENERAL DISEASES DEPENDENT UPON MORBID POISONS.</b>								
Class 1.								
Catarrhus epidemicus.....		361	313	7			41	1,788
Dysenteria acuta.....		5	3	2				21
Febris continua simplex.....		21	15	6				72
Febris enterica.....		4	2	2				104
Febris typho-malarialis.....		1		1				1
Febricula.....		2		2				2
Morbilli.....		3		3				3
Portusalis.....		1	1					43
Scarlatina.....		2	1	1				32
Vaccina.....	1	24	25					147

## Navy-yards and stations—Detailed statement, 1891—Continued.

Diseases.	Remaining from last year.	Admitted.	Discharged to duty.	Invalided.		Died.	Continued to next year.	Total number of sick days.
				To hospital.	From service.			
GENERAL DISEASES DEPENDENT UPON MORBID POISONS—continued.								
Class 2.								
Cachexia malarialis.....		5	5					27
Febris intermittens.....		73	60	4				353
Febris remittens.....	1	9	7	4				73
Class 3.								
Erysipelas.....		3	2	1				10
Class 4.								
Gonorrhœa.....	1	51	22	20			1	250
Syphilis primitiva.....		3	2	1				59
Syphilis consecutiva.....		11	7	4				105
GENERAL DISEASES DEPENDENT UPON CAUSES OTHER THAN MORBID POISONS.								
Class 1.								
Caloris effectus.....		2	1	1				7
Class 2.								
Alcoholismus.....		30	31	4	1			105
UNCLASSIFIED DISEASES.								
Anæmia.....		1	1					3
Diabetes.....		2	2					73
Lumbago.....		4	4					24
Pleurodynia.....		1	1					2
Podagra.....		3	3					8
Rheumatismus.....	2	101	80	12	2			738
Rheumatismus acutus.....		17	14	3				161
LOCAL DISEASES.								
Diseases of the nervous system.								
Cephalalgia.....	3	80	81	2				201
Convulsio.....		1					1	27
Dementia.....		2		2				6
Epilepsia.....		9	3	4	1		1	23
Insomnia.....		1	1					49
Mania.....		5	2	3				12
Neuralgia.....	2	29	29	12				147
Neurasthenia.....		10	8	12				136
Paralysis.....		3	2	1				84
Sciatica.....		2	2					4
Tetanus.....		1				1		5
Vertigo.....		15	14	1				38
Diseases of the eye.								
Amaurosis.....		3	1	1			1	46
Asthenopia.....		5	5					15
Atrophy of optic nerve.....	1		1					2
Blepharitis.....		6	6					18
Cataracta.....		1		1				8
Conjunctivitis.....		24	23	1				127
Hordeolum.....		4	4					19
Iritis.....		3	1	2				21
Keratitis.....		1	1					2
Neuritis optica.....		1	1					74
Diseases of the ear.								
Otalgia.....		5	5					20
Otitis.....		7	6	1				32
Otorrhœa.....		4	3	1				17
Ruptura mem. tympani.....		1	1					1
Surditas.....	1	1		1	1			5



## Navy-yards and stations—Detailed statement, 1891—Continued.

Diseases.	Remaining from last year.	Admitted.	Discharged to duty.	Invalided.		Died.	Continued to next year.	Total number of sick days.
				To hospital.	From service.			
LOCAL DISEASES—continued.								
<i>Diseases of the nose.</i>								
Epistaxis .....		2		1			1	3
<i>Diseases of the circulatory system.</i>								
Aneurysma .....		1		1				17
Angina pectoris .....		5	2			3		25
Dilatatio cordis .....		1		1				37
Morbi valvularum cordis .....		7	1	3		3		32
Palpitation .....	2	7	7	1			1	65
Phlebitis .....		1	1					4
Varix .....		1		1				1
<i>Diseases of the respiratory system.</i>								
Asthma .....		4	4					127
Bronchitis acuta .....	3	60	52	8			3	481
Bronchitis chronica .....		28	19	9				147
Catarrhus .....	3	298	295	3			3	1,335
Emphysema .....		1	1					4
Hæmoptysis .....		3	1	2				9
Laryngitis .....	1	11	11	1				116
Phthisis pneumonica chronica .....		6		6				21
Pleuritis .....		7	6	1				74
Pneumonia .....		18	7	9		2		262
Pulmonis congestio .....		1	1					9
<i>Diseases of the digestive system.</i>								
Caries dentium .....		1	1					11
Odontalgia .....		8	8					13
Parulis .....		2	2					12
Cholera morbus .....		7	7					21
Colica .....		32	32					88
Constipatio .....	2	20	20	1	1			63
Congestio hepatis .....		4	4					24
Dyspepsia .....	1	83	80	1			3	463
Diarrhœa acuta .....	4	252	250	4			2	669
Diarrhœa chronica .....		3	3	1				18
Enteritis .....		2	2					70
Epulis .....		1	1					2
Fissura in ano .....		1	1					13
Fistula in ano .....		4		4				4
Gastritis .....		6	4	2				37
Hæmorrhoids .....		11	8	3				90
Icterus .....		1		1				1
Pharyngitis .....		22	19	3				161
Tonsillitis .....	1	107	91	14			3	347
Typhlitis .....		1				1		2
<i>Diseases of the lymphatic system.</i>								
Adenitis .....		16	10	6				106
Splenitis .....		1		1				43
<i>Diseases of the urinary system.</i>								
Albuminuria .....	1	6	4	1		1	1	86
Calculus .....		1	1					8
Cystitis .....		10	4	4	1	1		105
Dysuria .....		1	1					2
Enuresis .....		3	1	1	1			25
Nephritis .....		2		1		1		26
<i>Diseases of the generative system.</i>								
Chaneroides .....	1	6	5	2				88
Epididymitis .....		1	1					10
Hydrocele .....		1	1					12
Orchitis .....		13	9	4				99
Paraphymosis .....		1	1					8
Urethra strictura .....		5		5				5
Varicocele .....		1	1					13

*Navy-yards and stations—Detailed statement, 1891—Continued.*

Diseases.	Remaining from last year.	Admitted.	to Discharged duty.	Invalided.		Died.	Continued to next year.	Total number of sick days.
				To hospital.	From service.			
LOCAL DISEASES—continued.								
<i>Diseases of the locomotor system.</i>								
Bunion .....		1		1				1
Periostitis .....		1		1				1
Synovitis .....		1	1					2
<i>Diseases of the integumentary system.</i>								
Abscessus .....	1	33	29	5				289
Acne .....		2	2					4
Anthrax .....		1	1					7
Bursitis .....		1	1					11
Clavus .....		3	3					10
Eczema .....		6	5	1				33
Erythema .....		1	1					1
Furunculus .....	1	32	32	1				147
Herpes .....		3	3					20
Onychia .....		1	1					15
Paronychia .....		2	2					23
Psoriasis .....		1		1				1
Scabies .....		2	2					18
Tinea .....		1	1					20
Ulcus .....		13	10	3				85
Urticaria .....		4	3	1				10
POISONS.								
Vulnus venenatum .....		4	4					32
TUMORS AND CYSTS (MALIGNANT OR NON-MALIGNANT).								
Adenoma .....		1	1					6
Cystis .....		1	1					4
Epithelioma .....		1				1		111
Fibroma .....		1	1					34
Lipoma .....		1		1				3
INJURIES, ETC.								
Abrasio .....		14	14					58
Ambustio .....		5	5					22
Concussio .....		23	23					71
Contusio .....		27	26	1				138
Fractura .....		6		6				6
Hernia .....		5		5				26
Luxatio .....		2	1	1				3
Stromma .....	2	73	77	2			1	436
Subluxatio .....		1	1					11
Suicidium .....		1				1		1
Vulnus contusum .....	1	29	28	2				152
Vulnus incisum .....		15	14	1				105
Vulnus laceratum .....		16	15	1				111
Vulnus punctum .....		7	7					33
Vulnus sclopetarium .....		2	1	1				64
Total .....	36	2,448	2,141	255	8	16	64	13,106

*Naval hospitals—General aggregate, 1891.*

Classification of diseases:	Remaining from last year.	Admitted.	Discharged to duty.	Invalided.		Died.	Remaining at the end of the year.	Total number of sick days.
				To hospital.	From service.			
Morbid states and processes irrespective of parts affected.....	1	16	10	2	1	1	3	928
General diseases, dependent upon morbid poisons:								
Class 1.....	12	128	110	.....	2	2	26	3,859
Class 2.....	8	64	66	1	1	2	2	1,800
Class 3.....	4	9	12	.....	.....	.....	1	686
Class 4.....	42	145	148	2	15	.....	22	9,824
Dependent upon causes other than morbid poisons:								
Class 1.....	.....	1	1	.....	.....	.....	.....	22
Class 2.....	1	80	79	.....	.....	.....	2	537
Developmental diseases.....	.....	1	1	.....	.....	.....	.....	68
Unclassified diseases.....	32	122	119	1	14	.....	20	8,543
Local diseases:								
Diseases of the nervous system.....	20	106	74	15	27	.....	10	5,754
Diseases of the eye.....	6	25	21	1	5	.....	4	2,255
Diseases of the ear.....	2	12	10	.....	2	.....	2	712
Diseases of the nose.....	.....	4	4	.....	.....	.....	.....	50
Diseases of the circulatory system.....	6	43	21	.....	11	4	13	3,085
Diseases of the respiratory system.....	39	211	169	4	27	11	39	12,400
Diseases of the digestive system.....	20	151	142	2	7	7	13	4,693
Diseases of the lymphatic system.....	14	43	45	2	1	.....	9	3,483
Diseases of the urinary system.....	6	41	26	2	6	2	11	2,722
Diseases of the generative system.....	14	60	62	2	4	.....	6	2,860
Diseases of the locomotor system.....	.....	12	6	.....	1	.....	5	790
Diseases of the integumentary system.....	12	53	54	.....	3	3	5	3,054
Parasitic diseases.....	.....	1	1	.....	.....	.....	.....	15
Tumors and cysts—malignant or nonmalignant.....	3	5	6	.....	1	1	.....	400
Surgical operations.....	1	1	.....	.....	.....	.....	1	45
Injuries, etc.....	18	137	109	3	22	1	20	7,401
Feigned diseases.....	.....	2	2	.....	.....	.....	.....	3
Total.....	*260	1,473	1,298	37	150	34	214	75,998

\* The report for 1891 shows 249 patients remaining on the list at the close of the year. The apparent discrepancy is due to the transfer of 11 cases remaining from the navy-yard to the Naval Hospital, Portsmouth, N. H., making the 260 cases.

*Naval hospitals—Detailed statement, 1891.*

Diseases.	Remaining from last year.	Admitted.	Discharged to duty.	Invalided.		Died.	Continued to next year.	Total number of sick days.
				To hospital.	From service.			
MORBID STATES AND PROCESSES IRRESPECTIVE OF PARTS AFFECTED.								
Adynamia .....	1	10	8	1	1	.....	1	658
Atrophia .....	.....	3	1	.....	.....	.....	2	196
Hydrops .....	.....	1	1	.....	.....	.....	.....	62
Tuberculosis .....	.....	2	.....	1	.....	1	.....	12
GENERAL DISEASES, DEPENDENT UPON MORBID POISONS.								
Class 1.								
Catarrhus epidemicus .....	1	53	46	.....	.....	.....	8	935
Denguis .....	2	.....	2	.....	.....	.....	.....	190
Dysenteria acuta .....	1	6	7	.....	.....	.....	.....	116
Dysenteria chronica .....	1	2	2	.....	1	.....	.....	169
Febris continua simplex .....	.....	13	13	.....	.....	.....	.....	410
Febris enterica .....	5	21	6	.....	1	2	17	1,000

*Naval hospitals—Detailed statement, 1891—Continued.*

Diseases.	Remaining from last year.	Admitted.	Discharged to duty.	Invalided.		Died.	Continued to next year.	Total number of sick days.
				To hospital.	From service.			
GENERAL DISEASES, DEPENDENT UPON MORBID POISONS—continued.								
Class 1—Continued.								
Febricula .....		3	3					89
Febris typho-malarialis .....	2	2	4					132
Morbilli .....		23	23					755
Scarlatina .....		1	1					39
Varicella .....		4	3				1	74
Class 2.								
Cachexia malarialis .....	1	5	5		1			143
Febris intermittens .....	2	28	29	1				600
Febris remittens .....	5	31	32			2	2	1,057
Class 3.								
Erysipelas .....	4	9	12				1	686
Class 4.								
Gonorrhoea .....	10	61	64		2		5	2,854
Syphilis primitiva .....	5	12	14	1	1		1	766
Syphilis consecutiva .....	27	72	70	1	12		16	6,204
GENERAL DISEASES DEPENDENT UPON CAUSES OTHER THAN MORBID POISONS.								
Class 1.								
Caloris effectus .....		1	1					22
Class 2.								
Alcoholismus .....	1	79	79				1	532
Maaniapetu .....		1					1	5
DEVELOPMENTAL DISEASES.								
Senectus .....		1	1					68
UNCLASSIFIED DISEASES.								
Anæmia .....	1	5	5					379
Beri beri .....	5		5					185
Lumbago .....		1	1					20
Rheumatismus .....	21	98	88	1	13		17	6,485
Rheumatismus acutus .....	5	18	19		1		3	1,474
LOCAL DISEASES.								
Diseases of the nervous system.								
Apoplexia .....		2	2					67
Cephalalgia .....	4	4	4		4			163
Convulsio .....		5	5					223
Dementia .....	2	12	2	7	3		2	605
Epilepsia .....	2	13	8		6		1	371
Hysteria .....		1	1					15
Insolatio .....		2	2					18
Insomnia .....		2	2					42
Imbecillitas .....		2			2			88
Locomotor ataxia .....	2	2	1	1	1		1	742
Mania .....		5	3	2				95
Melancholia .....	1	6		3	4			195
Neuritis .....		1					1	14
Neuralgia .....	2	20	21				1	564
Neurasthenia .....		9	7	1	1			213
Paralysis .....	7	12	9	1	5		4	2,029
Sciatica .....		3	2		1			197
Vertigo .....		5	5					113
Diseases of the eye.								
Amaurosis .....	1		1					243
Chenopia .....		1	1					1

## Naval hospitals—Detailed statement, 1891—Continued.

Diseases.	Remaining from last year.	Admitted.	Discharged to duty.	Invalided.		Died.	Continued to next year.	Total number of sick days.
				To hospital.	From service.			
LOCAL DISEASES—continued.								
<i>Diseases of the eye—Continued.</i>								
Cataracta.....	1	4	3		1		1	806
Conjunctivitis.....	3	8	9				2	410
Hypermetropia.....		2			2			53
Iritis.....		3	2				1	148
Keratitis.....		1			1			156
Ophthalmia.....		1			1			32
Retinitis.....		1	1					17
Ulcus corneae.....	1	4	4	1				389
<i>Diseases of the ear.</i>								
Otitis.....	1	9	6		2		2	645
Otorrhoea.....	1	2	3					36
Surditas.....		1	1					31
<i>Diseases of the nose.</i>								
Deviatio septi.....		1	1					12
Epistaxis.....		3	3					47
<i>Diseases of the circulatory system.</i>								
Aneurysma.....		5				1	4	813
Angina pectoris.....		2			2			139
Dilatatio cordis.....		2				1	1	327
Hypertrophica cordis.....		1	1					100
Morbi valvularum cordis.....	1	19	12		2	1	5	677
Palpitatio.....	4	9	6		5		2	699
Pericarditis.....		1					1	139
Ruptura cordis.....		1				1		2
Varix.....	1	3	2		2			189
<i>Diseases of the respiratory system.</i>								
Asthma.....	1	5	5				1	129
Bronchitis acuta.....	4	43	40		1		6	1,107
Bronchitis chronica.....	7	30	28	1	5		3	2,128
Catarrhus.....	1	15	14				2	185
Emphysema.....	1	1	2					77
Hæmoptysis.....	2	4	4		1		1	327
Laryngitis.....	1	4	4				1	536
Œdema pulmonum.....		1				1		1
Phthisis pneumonica acuta.....	1	5	2	1	1		2	508
Phthisis pneumonica chronica.....	11	47	21		17	5	15	4,215
Pleuritis.....	3	7	5				2	340
Pneumonia.....	7	49	44	2	2	3	5	2,787
<i>Diseases of the digestive system.</i>								
Odontalgia.....		1	1					7
Parulis.....		1	1					44
Ascites.....		2	2					179
Cholera morbus.....		4	4					18
Colica.....	2	8	10					114
Constipatio.....		6	5				1	123
Congestio hepatis.....	1	1		1		1		85
Cirrhis hepatitis.....	3	1	2		1		1	146
Dyspepsia.....	1	24	21		2		2	463
Diarrhoea acuta.....	2	27	29					196
Diarrhoea chronica.....	1	3	4					177
Enteritis.....		2	1			1		32
Fistula in ano.....	2	11	10		1		2	718
Gastritis.....	2	9	6		2	1	2	653
Gastrodynia.....		3	3					25
Hæmatemesis.....	1	1	1					69
Hæmorrhoids.....	3	11	12	1		1		361
Hepatitis acuta.....		1					1	10
Icterus.....	2	2	3		1			435
Obstructio intestinalis.....		1				1		3
Pharyngitis.....		4	4					44
Rhagades ani.....	2	2	2					51
Stomatitis.....		1	1					3

## Naval hospitals—Detailed statement, 1891—Continued.

Diseases.	Remaining from last year.	Admitted.	Discharged to duty.	Invalided.		Died.	Continued to next year.	Total number of sick days.
				To hospital.	From service.			
LOCAL DISEASES—continued.								
<i>Diseases of the digestive system—Continued.</i>								
Stenosis intestinalis .....		1				1		1
Tonsillitis .....	1	22	19				4	669
Typhlitis .....		1	1					45
Ulcus ventriculi .....		1				1		31
<i>Diseases of the lymphatic system.</i>								
Adenitis .....	14	42	44	2	1		9	3,477
Lymphangitis .....		1	1					6
<i>Diseases of the urinary system.</i>								
Albuminuria .....	1	5		2		1	3	430
Cystitis .....	8	17	12				8	1,137
Dysuria .....		2	2					14
Enuresis .....		6	2		4			189
Fistula in perineo .....		2	2					144
Hæmaturia .....	1	1	2					176
Nephritis .....	1	8	6		2	1		632
<i>Diseases of the generative system.</i>								
Balanitis .....	1		1					13
Chancroides .....	7	13	20					636
Epididymitis .....		1	1					48
Hydrocele .....		8	7		1			243
Oorchitis .....		15	12				3	573
Phymosis .....	1	1	2					32
Urethra strictura .....	5	17	15	2	2		3	1,150
Urethritis .....		2	2					43
Varicocele .....		3	2		1			123
<i>Diseases of the locomotor system.</i>								
Ankylosis .....		2	1				1	17
Arthritis .....		2	2					88
Bunion .....		1					1	72
Bursitis .....		1	1					91
Necrosis .....		1	1					121
Periostitis .....		4			1		3	334
Synovitis .....		1	1					57
<i>Diseases of the integumentary system.</i>								
Abcessus .....	4	18	17					1,066
Acne .....		1	1					51
Anthrax .....		3	3					110
Clavus .....		1			1			27
Ecthyma .....	1		1					177
Eczema .....	2	5	6				1	281
Furunculus .....		2	2					16
Herpes .....		2	2					24
Impetigo .....		1	1					42
Paronychia .....		1	1					31
Pityriasis .....		2	2					83
Psoriasis .....		1			1			39
Rupia .....	1		1					132
Scabies .....		4	4					72
Sycosis, nonparasitic .....	1				1			93
Tinea .....	1		1					4
Ulcer .....	2	10	10				2	800
Urticaria .....		1	1					5
Verruca .....		1	1					1
PARASITIC DISEASES.								
Verues .....		1	1					15

*Naval hospitals—Detailed statement, 1891—Continued.*

Diseases.	Remaining from last year.	Admitted.	Discharged to duty.	Invalided.		Died.	Continued to next year.	Total number of sick days.
				To hospital.	From service.			
TUMORS AND CYSTS (MALIGNANT OR NON-MALIGNANT).								
Carcinoma .....		1				1		44
Condyloma .....	1		1					32
Cystis .....	1		1					2
Chondroma .....		1			1			73
Epithelioma .....	1		1					161
Fibroma .....		1	1					24
Hæmatoma .....		1	1					46
Polypus .....		1	1					18
SURGICAL OPERATIONS.								
Amputatio .....		1					1	45
INJURIES, ETC.								
Ambustio .....	1	9	9			1		349
Concussio .....		1	1					10
Contusio .....	1	11	12					145
Fractura .....	10	30	29		5		6	3,053
Fractura effectus .....		2	1				1	5
Hernia .....	1	31	12	3	13		4	1,502
Luxatio .....	1	2	2		1			70
Strenua .....	3	15	14		1		3	769
Vulnus contusum .....		14	12				2	500
Vulnus incisum .....	1	8	8		1			320
Vulnus laceratum .....		7	6				1	121
Vulnus punctum .....		3	3					86
Vulnus sclopetarium .....		4			1		3	471
FEIGNED DISEASES.								
Asthma .....		1	1					2
Rheumatismus .....		1	1					1
Total .....	260	1,473	1,298	37	150	34	214	75,998

*Report of enlistments for the year 1891.*

Number of persons examined for the year 1891 .....	11,252
Number accepted .....	7,092
Number rejected .....	4,160
Number color-blind .....	198
Number rejected per thousand .....	369.71
Number color-blind per thousand .....	17.59

*Report of vaccinations for the year 1891.*

	Success-ful.	Unsuc-cessful.
No evidence of previous vaccination .....	204	244
Presenting good cicatrices .....	1,181	3,276
Evidence of former attack of smallpox .....	28	80

*Ratio per thousand of admissions for each class of disease of the force afloat.*

Classification of diseases.	Ratio per thousand.	Classification of diseases.	Ratio per thousand.
Morbid states and processes, irrespective of parts affected.....	11.16	Local diseases:	
General diseases:		Diseases of the circulatory system.....	5.01
Dependent upon morbid poisons:		Diseases of the respiratory system.....	92.31
Class 1.....	101.32	Diseases of the digestive system.....	124.98
Class 2.....	48.66	Diseases of the lymphatic system.....	25.64
Class 3.....	1.36	Diseases of the urinary system.....	8.29
Class 4.....	41.14	Diseases of the generative system.....	23.50
Dependent upon causes other than morbid poisons:		Diseases of the locomotor system.....	4.99
Class 1.....	8.32	Diseases of the integumentary system.....	75.23
Class 2.....	17.77	Parasitic diseases.....	.11
Developmental diseases.....	.79	Poisons.....	1.61
Unclassified diseases.....	69.85	Tumors and cysts, malignant or non-malignant.....	1.59
Local diseases:		Surgical operations.....	.63
Diseases of the nervous system.....	39.43	Injuries, etc.....	170.73
Diseases of the eye.....	12.19	Total.....	904.36
Diseases of the ear.....	3.86		
Diseases of the nose.....	1.25		

## SUMMARY—FORCE AFLOAT.

Daily average number of sick.....	162.29
Average number of days each case was under treatment.....	7.46
Admissions per thousand of mean strength.....	904.36
Invaliding per thousand of mean strength.....	84.98
Deaths per thousand of mean strength.....	4.67

*General statistics.*

Mean strength of the Navy and Marine Corps, including officers and men, for the year 1891:	
Officers of the Navy and Marine Corps on the active list.....	1,535
Enlisted men of the Navy.....	7,910
Enlisted men of the Marine Corps.....	2,056
Total.....	11,501
Mean strength of the Navy and Marine Corps, including officers and men of the force afloat.....	8,774
Total number of cases under treatment during the year 1891:	
Naval hospitals.....	1,733
Navy-yards and stations.....	2,484
Vessels afloat and receiving-ships.....	7,924
Total.....	12,141
Total number of days the sick were under treatment during the year 1891:	
Naval hospitals.....	75,998
Navy-yards and stations.....	18,106
Vessels afloat and receiving-ships.....	59,237
Total.....	153,341
Total number of deaths from all causes during the year 1891:	
Naval hospitals.....	24
Navy-yards and stations.....	16
Vessels afloat and receiving-ships.....	41
Total.....	81
Ratio per thousand of deaths in the Navy for the year 1891.....	7.91



*Mortuary record of the Navy for the year 1891.*

Causes of death.	Number of deaths.			Total.
	Hospitals.	Yards and stations.	Vessels.	
Abscesses .....	2		1	4
Adynamia .....		1		1
Albuminuria .....	1	1		2
Ambustio .....	1		2	3
Aneurysma .....	1		1	2
Angina pectoris .....		3	1	4
Catarrhus epidemicus .....			3	3
Carcinoma .....	1			1
Congestio hepatis .....	1			1
Concussio .....			1	1
Cystitis .....		1	1	2
Dilatatio cordis .....	1			1
Enteritis .....	1			1
Encephalitis .....			1	1
Epithelioma .....		1		1
Febris enterica .....	2		3	5
Febris remittens .....	2		1	3
Fractura .....			3	3
Gastritis .....	1			1
Hæmorrhoids .....	1			1
Morbi valvularum cordis .....	1	3		4
Nephritis .....	1	1	2	4
Oedema pulmonum .....	1			1
Obstructio intestinalis .....	1			1
Paralysis .....			1	1
Peritonitis .....			2	2
Phthisis pneumonica chronica .....	5		1	6
Pleuritis .....	2			2
Pneumonia .....	3	2	1	6
Ruptura .....	1			1
Sarcoma .....			1	1
Stenosis intestinalis .....	1			1
Suicidium .....		1		1
Submersio .....			7	7
Tetanus .....		1		1
Tuberculosis .....	1		2	3
Typhlitis .....		1		1
Ulcus ventriculi .....	1			1
Variola .....			1	1
Vulnus incisum .....			2	2
Vulnus laceratum .....			1	1
Vulnus sclopetarium .....			2	2
Total .....	34	16	41	91

# CONTRACTS.

## *Proposals for supplies to naval laboratory, Brooklyn, N. Y., August 27, 1891.*

Bidders.	Class I, surgical in- struments.	Class II, hospital furniture.
Dudley, Sumner F*.....	\$1,628.50	.....
Manhattan Supply Company†.....	1,670.76	\$2,375.06

\* Class I was awarded to Sumner F. Dudley.

† Class II was awarded to Manhattan Supply Company.

## *Proposals for supplies to naval laboratory, Brooklyn, N. Y., September 7, 1891.*

Bidders.	Class I, hardware.	Class II, lumber.
Brombacher, A. F., & Co.....	\$1,119.00	.....
Pell, Charles E.....	.....	\$628.17
Manhattan Supply Company.....	793.79	.....
F. T. Witte Hardware Company.....	915.90	.....
Paine, A. W.....	990.55	.....
Hogarth, Robert.....	780.49	.....

Class I was awarded to Robert Hogarth. Class II was awarded to Charles E. Pell.

## *Proposals for supplies to naval hospital, Norfolk, Va., September 29, 1891.*

Bidders.	Class I, fire pump and stand pipes.	Class II, rubber hose and hanging hooks for stand pipes.	Class III, bricks, cement, and lead.
Forsyth Manufacturing Company, S. C.....	\$594.76	.....	.....
Colwell Lead Company.....	507.63	.....	.....
Neville, George L.....	682.00	\$503.00	\$12.00
Codd, W. C.....	598.46	.....	.....
Manhattan Supply Company.....	532.21	461.50	.....
Donegan & Swift.....	523.40	.....	.....
White, Ira B.....	549.95	400.80	17.00
Page Belting Company.....	.....	327.70	.....
Numeyer & Co.....	.....	.....	12.25

Class I was awarded to Colwell Lead Company. Class II was awarded to Page Belting Company  
Class III was awarded to George L. Neville.

## *Proposals for building a residence for medical director at naval hospital, Mare Island, California, November 2, 1892.*

Bidders.	Oak finish.	Redwood finish.
McKenzie, James B.....	\$15,300.00	\$14,900.00
Blumer, Jacob.....	18,225.00	17,325.00
Massey, John.....	12,850.00	12,700.00
McKay, John.....	15,100.00	14,900.00
Matherson, Daniel H.....	17,490.00	16,800.00
Bassett, Thomas B.....	15,640.00	15,140.00
Brennan, Patrick J.....	17,300.00	16,700.00

The contract was awarded to James B. McKenzie for redwood finish.

*Proposals for electric-light supplies to naval hospital, Norfolk, Va., November 24, 1891.*

Bidders.	Amount.
Western Electric Company .....	\$1,147.40
George L. Neville .....	1,241.82
O. Emerson Smith .....	1,836.87

The contract was awarded to Western Electric Company.

*Proposals for laundry machinery at naval hospital, Philadelphia, Pa., March 15, 1892.*

Bidders.	Amount.
The A. M. Dolph Company .....	\$1,550.00
Troy Laundry Machinery Company .....	1,535.80

The contract was awarded to the Troy Laundry Machinery Company.

*Proposals for supplies to naval laboratory, Brooklyn, N. Y., April 19, 1892.*

Bidders.	Class I, bedding.	Class II, surgical in- struments.	Class III, surgical appliances.	Class IV, dispensary furniture.	Class V, hospital furniture.
Bernstein, William F. ....	\$1,071.00				
Wechsler, Joseph .....	1,056.57				
Manhattan Supply Company .....	1,041.70	\$1,622.94	\$1,625.05	\$387.92	\$412.18
Kerston & Kaysan .....		1,721.62			
King, Richard & Co. ....		1,739.52			
Pleasant, Charles H. ....		1,903.46	1,866.98	506.79	
Dudley, Sumner F. ....		1,737.86			
Gallagher, Joseph .....			1,907.02	615.63	
McKesson & Robbins .....			1,791.55	432.41	
Hazzard, Hazzard & Co. ....		1,900.32			

Contracts for Classes I, II, III, IV, V, were awarded to the Manhattan Supply Company. Bid of Hazzard, Hazzard & Co. was informal.

*Proposals for steam-heating apparatus for naval hospital, Washington, D. C., May 31, 1892.*

Bidders.	Amount.
Pope, Samuel J., & Co. ....	\$2,375.00
Zellers & Co. ....	2,480.00
Hendley & Biggs .....	2,832.50
Blake & Williams .....	1,984.00

Contract was awarded to Blake & Williams.

*Proposals for Portland cement for naval hospital, Norfolk, Va., June 10, 1892.*

Bidders.	Amount.
International Trading and Electric Company .....	\$141.75
Niemeyer & Bridges .....	130.50
Greeley, E. S. & Co. ....	155.25
Pleasant, Charles H. ....	168.75
Navarro, Alfonso de .....	138.60
White, E. V. & Co. ....	126.00
Neville, George L. ....	130.50

Contract was awarded to E. V. White & Co.

*Proposals for annual supplies to naval hospital, Portsmouth, N. H., May 24, 1892.*

Bidders.	Class I, meats.	Class II, groceries.	Class III, butter, cheese, etc.	Class IV, ice.	Class V, milk.	Class VI, bread.
Walker, H. M. ....					\$150. 00	
Norton & Co., D. C. ....	\$903. 87	\$628. 32	\$350. 00		150. 00	287. 50
Prince, C. M. ....	643. 60	778. 64	376. 00			
Paul, H. R. ....	658. 32	839. 56	366. 00		178. 50	300. 00
Chase, J. E. ....	533. 08	611. 35	342. 00		150. 00	287. 50

Classes I, II, III, V, and VI, were awarded to James E. Chase.

*Proposals for annual supplies to naval hospital, Chelsea, Mass., May 24, 1892.*

Bidders.	Class I, meats.	Class II, groceries.	Class III, butter, eggs, etc.	Class IV, ice.	Class V, milk.	Class VI, bread.	Class VII, provender.
Gunsenhisier, Abram. ....	\$1,950. 00						
McBride, Francis * .....	1,680. 17	\$1,274. 28½	\$650. 00		\$500. 00	\$500. 00	
Simonds, Charles A. ....	1,379. 83	1,295. 26	622. 00	\$300. 00	399. 00	350. 00	
Sanderson, George A. ....						350. 00	
Doran, M. J. ....	1,649. 80	1,539. 96	734. 00				
Fahrenheit Bros.* .....							
Bacon, A. J., & Co. ....	1,573. 71	1,428. 42½	680. 00		450. 00	350. 00	
Lewis, J. E., & Co. ....							\$324. 79

Classes I, II, III, IV, V, and VI were awarded to Charles A. Simonds. Class VII was awarded to J. E. Lewis & Co.

\* Bids were informal and could not be considered.

*Proposals for annual supplies to Naval Hospital, New York, May 24, 1892.*

Builders.	Class I, meats.	Class II, groceries.	Class III, butter, eggs, etc.	Class IV, ice.	Class V, milk.	Class VI, bread.	Class VII, provender.
Morrison, P. J. ....	\$2,861. 25	\$2,509. 34	\$2,356. 00	\$605. 00		\$613. 75	
Ahrens Sons, G. ....		2,634. 28	2,359. 00				
Behlen, Anton. ....						819. 00	
Stainsby, J. P. ....	3,055. 50					1,575. 00	
Ketchum, A. S.* .....			2,482. 00				
Belford, W. H. ....			3,165. 00	550. 00	\$2,160. 00	1,470. 00	
Koch, Andrew. ....	4,198. 50	3,086. 64					\$480. 55
Wright, William. ....			3,368. 00	605. 00	2,092. 52		1546. 00
Evans, W. H. ....	3,317. 00						

\* Informal.

† For naval laboratory.

Classes I, II, III, and VI were awarded to Patrick J. Morrison; class IV was awarded to W. H. Belford; class V was awarded to William Wright; class VII was awarded to Andrew Koch.

*Proposals for annual supplies to Naval Hospital, Philadelphia, Pa., May 24, 1892.*

Bidders.	Class I, meats.	Class II, groceries.	Class III, butter, eggs, etc.	Class IV, ice.	Class V, milk.	Class VI, bread.
Sproul, Samuel. ....		\$1,435. 95	\$815. 10			
Strickland, John T. ....	\$2,994. 10		851. 03	\$420. 00	\$297. 00	
McKeown, Robert. ....		1,322. 23	853. 08	406. 00	714. 00	\$52. 00
Boraef & Co., L. Shuster. ....	3,162. 55					

Classes I and V were awarded to John T. Strickland. Classes II, IV, and VI were awarded to Robert McKeown. Class III was awarded to Samuel Sproul.

*Proposals for annual supplies to Naval Hospital, Washington, D. C., May 24, 1892.*

Bidders.	Class I, meats.	Class II, groceries.	Class III, butter, eggs, etc.	Class IV, ice.	Class V, milk.	Class VI, bread.
Browning & Middleton .....		\$762.15	\$335.50	\$120.00	\$247.50	\$197.50
Seibert, F. P. ....	\$929.90					
Castell, Edward .....	1,036.85					
Talbert & McCauley .....		785.81	386.40	160.00	225.00	200.00

Class I was awarded to F. P. Seibert; classes II, III, IV, and VI were awarded to Browning & Middleton; class V was awarded to Talbert & McCauley.

*Proposals for annual supplies to Naval Hospital, Norfolk, Va., May 24, 1892.*

Bidders.	Class I, meats.	Class II, groceries.	Class III, butter, eggs, etc.	Class IV, ice.	Class V, milk.	Class VI, bread.	Class VII, proven- der.
Woodward, E. L. ....	\$2,327.20						
Parker & Bros., J. T. ....	\$1,743.52	\$921.18	\$1,700.00	\$750.00	\$518.70	\$195.52	
Nash, C. R. ....			382.50				
Naw, V. J. ....					487.50		
Maupin, W. G. ....			386.75				
Barlow, T. J. ....	1,768.11	1,068.15					
Rieger, F. ....					468.00		
Codd, John A. ....	1,997.71		1,171.10		712.50		
Robertson, C. R. ....	2,413.20						

Classes I and V were awarded to John A. Codd; classes II, III, and VII were awarded to J. T. Parker & Bro.; class IV was awarded to C. R. Nash; class VI was awarded to F. Rieger.

*Proposals for annual supplies to Naval Hospital, Pensacola, Fla., May 24, 1892.*

Bidders.	Class I, meats.	Class II, groceries.	Class III, butter, eggs, etc.	Class IV, ice.	Class V, milk.	Class VI, bread.	Class VII, proven- der.
Mooney, M. ....	\$81.67	\$258.53	\$52.95	\$30.00	\$30.00	\$30.00	\$139.15
Philibert, B. A. ....	97.23	272.57	55.75		45.00	30.00	137.40
Dolphin, Benjamin .....	77.395	254.34	48.70	30.00	28.50	30.00	131.1925
Bauer, F. ....	88.47	275.74	56.20	30.00	45.00	33.00	129.51

Classes I, II, III, IV, V, and VI were awarded to Benjamin Dolphin; class VII was awarded to F. Bauer.

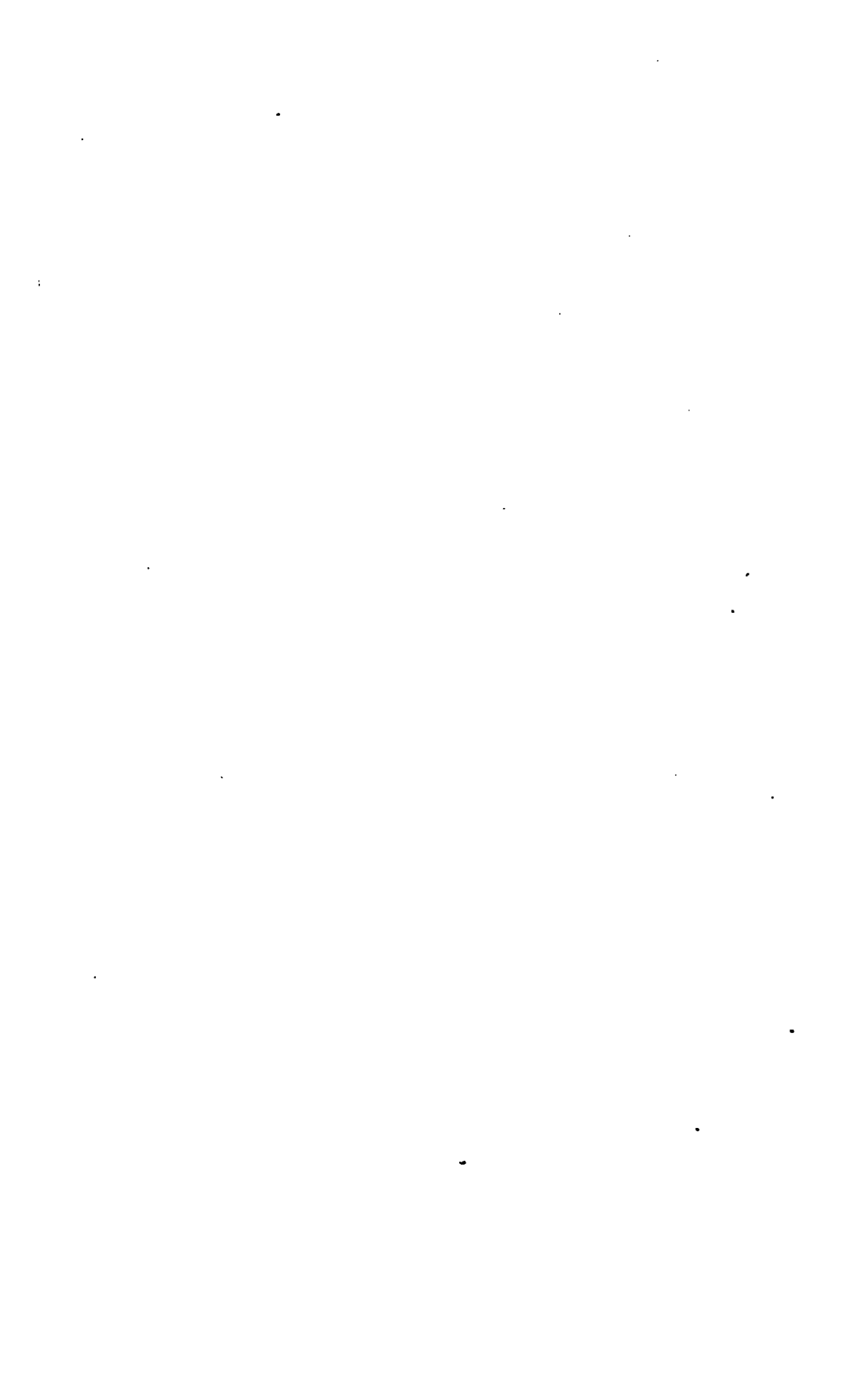
*Proposals for annual supplies to Naval Hospital and navy-yard, Mare Island, California, May 24, 1892.*

Bidders.	Class I, meats.	Class II, groceries.	Class III, butter, eggs, etc.	Class IV, ice.	Class V, milk.	Class VI, bread.	Class VII, proven- der.
Harrier, D. W. & Son .....		\$1,667.07	\$855.40	\$350.00	\$137.50	\$400.00	\$1,370.00 280.00 1,202.50 *280.00
Brownlie, James .....		1,532.505	735.00		66.00		
Brown, Samuel .....	\$1,964.25					300.00	
Boss, Joseph .....				210.00			
Connelly, Henry .....						390.00	
Brown & Fleming .....							
Wilson, E. M.† .....		1,105.99	900.00				
Twilegar, A. J.† .....				102.90	82.50		
Smith, James† .....						300.00	
Megarry, James, & Co.† .....		1,500.23	870.29				
Lake, Lewis E. ....							1,380.50

\* For navy-yard dispensary.

† Proposals received after the bids had been opened and too late to be considered.

Class I was awarded to Samuel Brown; classes II, III, V, and VII were awarded to James Brownlie; class IV was awarded to Henry Connelly; class VI was awarded to Joseph Boss.



REPORT  
OF THE  
COMMANDANT OF THE UNITED STATES MARINE CORPS.

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HEADQUARTERS U. S. MARINE CORPS,  
*Washington, D. C., October 15, 1892.*

SIR: I have the honor to submit my annual report of the condition of the U. S. Marine Corps, a review in general of its service during the past year, and with such recommendations as it is believed will increase its efficiency.

I have made a personal inspection of all the posts except Mare Island, Cal.; Sitka, Alaska, and the naval station, Port Royal, S. C., and found them in excellent condition. It is my intention to request orders to visit these three posts in the spring.

The varied employment of marines on detached service, which they are constantly called upon to perform, such as the recent necessity for a large battalion at the quarantine station at Sandy Hook, N. J., and another one for the ceremonies attending the opening of the World's Columbian Exposition at Chicago, Ill., have so depleted the force at the navy-yards, as to make it impossible for the duty to be properly performed, as the necessary number of sentinels to protect the Government property can not be maintained. A permanent guard to be kept at the Columbian Exposition during the coming summer, and the prospective demand for an increase of the number of men required for sea service, to be occasioned by placing in commission several of the new ships of the Navy, which are now nearing completion, will still further reduce the effective force on shore, and in consequence the duty on the men will be still harder.

It is believed that, had it been possible to leave a sufficient force of marines at the navy yard, New York, when the battalion was on duty at Sandy Hook, the recent disastrous fire at that yard, which occasioned so much damage to the engines of the U. S. S. *Cincinnati*, would not have occurred. The number of sentinels was necessarily reduced, and the buildings were not adequately protected, and made it possible for incendiaries to gain an entrance.

Owing to the limited number of men allowed the corps by present appropriation, and the extra demands that have been made during the past year, it is very rare that men have better duty than "day on and day off." In the Army there is an order that men shall never have less than five days off duty.

In view of these facts I again urgently recommend that the corps be increased, and that the strength as authorized by section 1596, Revised Statutes, be allowed. This can be easily accomplished by an increase

of appropriation, no new legislation being necessary, and I trust that the Department will agree with me in recognizing the urgent necessity for these additional men. In connection with this proposed increase of the corps I again renew my recommendation of last year, that provision be made for twelve quartermaster-sergeants, for duty at the posts and the assistant quartermasters' offices. These men are much needed.

In my report of last year I recommended that the act of Congress approved June 16, 1890, entitled "An act to prevent desertions from the Army, and for other purposes," be made applicable to the Marine Corps. As it has been shown in the Army that the passage of this act has been of great benefit to the enlisted men, and has accomplished the desired end in materially reducing the number of desertions, I again earnestly renew my recommendation that the necessary legislation be requested to make this entire act applicable to the Marine Corps.

By the passage of the act providing for the examination for promotion of certain officers of the Marine Corps, approved July 28, 1892, in accordance with my recommendation, the corps is now on an equality in this regard with officers of the Army and Navy, and it is certain that great benefit will be derived from its operation in making the officers more diligent in the study of their profession. Already three officers have been examined in accordance with this act, and the examinations will be made more stringent each succeeding year. I have submitted a proposed scope of the examination to the Department, which it is thought covers all points, and all that is required to make this operative is your approval and the issuing of an order from the Department.

The changes in the uniform recommended by the board of last year, and approved by the Department, have been made and are now in effect. It is thought they greatly improve the appearance of both officers and men.

The recommendation of last year in regard to the classification of the members of the band of the United States Marine Corps is again renewed, and it is hoped some action will be taken whereby the condition of these worthy men, who give so much pleasure to so many people by their excellent music, may be improved, and that the classification authorized by the Department in May, 1890, be again restored, as tending to still further improve the efficiency of a band which is national in its character, and which has so many demands made upon it for service.

Upon opening the bids for the new barracks at the naval station, Port Royal, S. C., for which Congress appropriated \$3,000, it was found that the lowest bid was \$5,600, and the man who made it stated that the building could not be erected for a less sum. In view of this I have directed the quartermaster to include in his annual estimates the sum of \$2,600, necessary to build these barracks, and request that it be made immediately available, as the men are at present quartered in a temporary structure, which is not adequate for their comfort and convenience.

The quartermaster has also included in his estimates, by my direction, an item of \$15,000 for a barracks at the naval training station at Newport, R. I., to be made immediately available. The necessity for these barracks is fully set forth in my letter of the 3d ultimo, inclosing the annual estimates, and also in the accompanying papers, and I sincerely trust that, as this is to be a permanent station and is one of importance to the Navy, Congress will be urged to make the appropriation, in order that the marines stationed there, who are now quar-



tered in tents, may be made more comfortable, and on an equal footing in regard to quarters with the apprentice boys of the Navy under instruction there, who are lodged in a large well-heated building.

Since my last report the barracks at Sitka, Alaska, have been completed, and the men who were attached to the U. S. S. *Pinta* have been transferred on shore and a post of the Marine Corps has been regularly established. Regular details of a guard for the *Pinta* continue to be made as heretofore whenever required.

Electric light has been introduced into the Mare Island barracks and officers' quarters, and they are greatly improved thereby.

In order to encourage the enlisted men to save their money that they may have a little sum to start with should they desire to leave the service at the expiration of their enlistment, I recommend that the act of Congress approved February 9, 1889, entitled, "An act to provide for the deposits of the savings of seamen of the U. S. Navy," be made applicable to the Marine Corps, and that the necessary legislation be enacted to accomplish this end.

The Attorney-General, under date of July 31, 1890, decided that the act as passed does not apply to the Marine Corps.

During the past year all the posts but one have been supplied with the wire bunk bottoms, pillows, pillow cases, and sheets, and this, with the improvement of the ration and other benefits, has made the men very much more comfortable and contented, and as a consequence the number of desertions has been reduced 20 per cent.

The order recently received from the Department directing that the quartermaster pay to the commanding officers of posts at the end of each month a sum equivalent to the contract price of the number of rations saved by the latter for their commands, will materially improve the table by increasing the company fund, which is used for that purpose.

The "Instructions for Infantry and Artillery, U. S. Navy," having been adopted for use in the Marine Corps, the officers and men have rapidly perfected themselves in the new drill.

Until recently the marines on board nearly all the new ships of the Navy were assigned to duty to man the guns of the secondary battery, but an order has been issued by the Department directing that they be not so assigned, and as a consequence the men have been taken away from the guns. Wherever they served at these guns their proficiency in handling them has been commended. As marines are required to be instructed in artillery, and as it is thought the efficiency of all ships will be increased by their assignment to the secondary battery, I respectfully and earnestly solicit that the Department will issue an order to that effect.

During the cholera excitement in New York, and upon the establishment of a quarantine camp at Sandy Hook for the detention of emigrants, by order of the Department a battalion of marines, under command of Maj. R. W. Huntington, consisting of ten commissioned officers and two hundred and one enlisted men, was ordered there for patrol duty to prevent the escape of any of those detained. These men were housed under canvas and established a regular camp on this sand spit. They rendered the most efficient service to the country in helping to prevent the introduction of cholera. The battalion was formed from detachments drawn from the small force at the navy-yards at Boston, Brooklyn, League Island, Annapolis, Norfolk, Washington, D. C., and the Marine Barracks, Washington, D. C., the United States receiving ship *Vermont*, and the U. S. S. *Atlanta* and *Minnesota*. In some

cases, notably that of the Marine Barracks, Washington, prepared to start for Brooklyn, in heavy marching order, after the order to proceed was received. In Boston route in less than one hour after the receipt of the order, and in New York not later than the morning after the order was received, some the same day. This shows in a marked degree the efficiency of both officers and men, and the cheerfulness with which they are required to perform, on the shortest notice, all and any duty that may be required of them, particularly in this case, which was attended with some danger and great exposure and discomfort. These men were isolated for over three weeks, having no communication with the outside world at all during that time, and they deserve the highest praise for the work they performed.

A battalion was organized at Brooklyn, and with the 1st S. Marine Corps, which was sent there by order of the Secretary, participated in the parade in New York on the 12th instant, on the occasion of the Columbus celebration.

Another battalion, consisting of fifteen companies of four companies of thirty-six men each, with the band and a total of fifty men, under command of Maj. R. W. Huntington, is to go to Chicago, Ill., from New York, by order of the Department, to participate in the ceremonies attending the opening of the new position there on the 19th, 20th, 21st, and 22d instant. They will leave New York on the morning of the 17th instant on a special train over the Pennsylvania Railroad, and will be quartered in the buildings at Jackson Park, Chicago.

My recommendation of last year relative to the report of the officers convened for the purpose of suggesting a means to overcome the present stagnation in promotion among the older officers, particularly the captains, is again renewed.

The School of Application, established at the Marine Barracks, Washington, D. C., under orders of May 1, 1891, has completed its first year of its existence, and the most excellent results have been attained in the course of instruction to both officers and enlisted men. In a very gratifying manner the advisability of its establishment has been proved, and the benefit that will result to the corps. The first class, consisting of the seven young graduates of the Naval Academy, appointed as second lieutenants in the U. S. Marine Corps, completed their course April 1, 1892, and were assigned to different shore stations. The next class of five officers, appointed July 1, 1892, is now under instruction here. Owing to the small number of officers and men, and the duty that is required of them, it has been impossible to order as many here for instruction as would be like. Many officers and enlisted men have applied to be admitted. I hope, if the corps is increased, to see large classes here, and gradually to have everyone in the corps instructed. The first annual report of Capt. D. P. Mannix, commanding the school, is closed herewith for the information of the Department, and is appended to this report.

On October 1, 1892, there were 1,877 enlisted men on board ships in commission, and 966 on the several shore stations.

Since October 1, 1891, there have been 905 casualties, caused by deaths, discharges, retirements,

## ESTIMATES, PAYMASTER MARINE CORPS.

No. 113.

HEADQUARTERS U. S. MARINE CORPS,  
Washington, D. C., September 3, 1892.

SIR: I inclose herewith for your approval the usual estimates for the support of the U. S. Marine Corps for the fiscal year ending June 30, 1894.

In addition to the usual estimates I have asked in those of the quartermaster, for the sum of \$2,600, necessary to erect the barracks authorized to be built at the naval station, Port Royal, S. C., and for which \$3,000 has already been appropriated. Also \$15,000 for quarters at the naval training station at Newport, R. I. This item is a very urgent one, and I request that the appropriation be made immediately available. The guard of the *Richmond*, now there, is stationed on shore in tents, and the men are subject to many hardships during the cold winter weather of that climate. The need for these barracks is fully set forth in the quartermaster's letter, and I trust the Department will urgently recommend that the appropriation be made. The quartermaster's letter, which I inclose, explains the necessity for the other items of his estimates.

I have included in those of the paymaster an increase of pay for the chief clerks of the quartermaster's, adjutant's, and inspector's, and my own office, to correspond with that allowed the chief clerk of the paymaster; also for the clerk of the assistant quartermaster in Philadelphia, Pa., to correspond with that of the one in Washington. The amounts are very small and I trust they may be granted, as the men who occupy these positions are very deserving. I also inclose a letter from the paymaster in relation to his estimates.

These estimates were prepared on the 1st instant, as directed by the Department in its instructions of July 19 last, but owing to the sickness of the quartermaster they could not be signed until to-day.

Very respectfully, your obedient servant,

CHARLES HEYWOOD,  
Colonel Commandant.

Hon. B. F. TRACY,  
Secretary of the Navy, Washington, D. C.

HEADQUARTERS UNITED STATES MARINE CORPS,  
PAYMASTER'S OFFICE,  
Washington, D. C., September 1, 1892.

SIR: I respectfully submit herewith estimates for the pay of officers, noncommissioned officers, musicians and privates, and civil force of the United States Marine Corps for the fiscal year ending June 30, 1894.

These estimates show an increase of \$16,844.63 over the estimates for the present fiscal year, viz:

Pay of officers on the retired list, increase .....	\$14,880.00
Pay of retired enlisted men, increase .....	4,894.63
Commutation of quarters, increase .....	550.00
	<hr/>
	20,324.63
Pay of officers on active list, decrease .....	\$1,980.00
Undrawn clothing, decrease .....	1,500.00
	<hr/>
	3,480.00
	<hr/>
	16,844.63

Very respectfully,

GREEN CLAY GOODLOW,  
Major and Paymaster, U. S. Marine Corps.

The COLONEL COMMANDANT, UNITED STATES MARINE CORPS,  
Headquarters, District of Columbia.

HEADQUARTERS UNITED STATES MARINE CORPS,  
Washington, D. C., September 3, 1892.

Respectfully referred to the Secretary of the Navy in connection with the estimates of the paymaster, U. S. Marine Corps.

CHARLES HEYWOOD,  
Colonel Commandant, U. S. Marine Corps.

*Estimate of appropriations required for the service of the fiscal year ending June 30, 1894, by the paymaster of the U. S. Marine Corps.*

Detailed object of expenditure, and explanation.	Estimated amount which will be required for each detailed object of expenditure.
<b>PAY OF MARINE CORPS.</b>	
Pay of officers on the active list: For 1 colonel commandant, 1 colonel, 2 lieutenant-colonels, 1 adjutant and inspector, 1 paymaster, 1 quartermaster, 4 majors, 2 assistant quartermasters, 20 captains, 30 first lieutenants, and 12 second lieutenants .....	\$179,320.00
Pay of officers on the retired list: Four colonels, 3 lieutenant-colonels, 1 major, 1 quartermaster, 2 assistant quartermasters, 8 captains, 3 first lieutenants, and 3 second lieutenants .....	55,867.50
Pay of noncommissioned officers, musicians, and privates: One sergeant-major, 1 quartermaster-sergeant, 1 leader of the band, 1 drum major, 50 first-sergeants, 140 sergeants, 180 corporals, 30 musicians, 96 drummers and fifers, and 1,600 privates .....	397,261.92
Pay of retired enlisted men: One sergeant-major, 1 drum major, 3 first-class musicians, 9 first sergeants, 12 sergeants, 2 corporals, 4 drummers and fifers, and 30 privates, and for those who may be retired during the year .....	24,654.03
Undrawn clothing: Payment of discharged soldiers for clothing undrawn .....	25,000.00
Mileage: Mileage to officers traveling without troops .....	9,000.00
Commutation of quarters to officers on duty without troops where there are no public quarters .....	4,550.00
<b>PAY OF CIVIL FORCE.</b>	
In the office of the colonel commandant: One chief clerk, \$1,540.80 (increase \$59.20 submitted) .....	1,600.00
One messenger, at \$80.94 per month .....	971.28
In the office of the adjutant and inspector: One chief clerk, \$1,540.80 (increase \$59.20 submitted) .....	1,600.00
One clerk .....	1,496.52
In the office of the paymaster: One chief clerk .....	1,600.00
One clerk .....	1,496.52
One clerk .....	1,257.12
In the office of the quartermaster: One chief clerk, \$1,540.80 (increase \$59.20 submitted) .....	1,600.00
One clerk .....	1,496.52
One clerk .....	1,257.12
In the office of the assistant quartermaster, Washington, D. C.: One clerk .....	1,400.00
In the office of the assistant quartermaster, Philadelphia, Pa.: One clerk, \$1,257.12 (increase \$142.88 submitted) .....	1,400.00
One messenger, at \$1.75 per diem .....	640.50
Total pay of civil force .....	17,815.58
Total amount to be appropriated under each head of appropriation .....	713,480.63
Amount appropriated for the current fiscal year ending June 30, 1893 .....	687,540.85
<b>PAY OF MARINE CORPS.</b>	
Pay for additional 974 enlisted men: Pay of noncommissioned officers, musicians, and private <sup>s</sup> (R. S., sec. 1596): 10 sergeants, 40 corporals, 12 drummers, 12 fifers, and 900 priva <sup>ts</sup> .....	153,384.00

## ESTIMATES, QUARTERMASTER, MARINE CORPS.

HEADQUARTERS U. S. MARINE CORPS,  
QUARTERMASTER'S OFFICE,  
Washington, D. C., September 3, 1892.

SIR: In submitting the annual estimates for the support of the Quartermaster's Department, U. S. Marine Corps, fiscal year ending June 30, 1892, I respectfully call your attention to the following changes in the amounts asked for, being for the same objects, as compared with the amounts appropriated by an act of Congress approved July 19, 1892 (for the same purpose), for the fiscal year ending June 30, 1893; also stating my reasons why the changes are deemed necessary:

Provisions (increased).....	\$22, 470. 13
Clothing (same).	
Fuel (same).	
Forage (increased).....	200. 00
Military stores (increased) .....	714. 00
Transporting and recruiting (increased) .....	1, 000. 00
Repair of barracks, including construction of barracks at Port Royal, S. C., and Newport, R. I. (increased).....	10, 088. 00
Hire of quarters (same).	
Contingent (increased).....	2, 500. 00

*Provisions.*—The increase in the amount, as estimated for, under the head of "Provisions," as compared with the sum appropriated for the same purpose, fiscal year 1892-'93, is made necessary in order to provide for the command at Sitka, Alaska (recently established), and to enable this office to subsist the guard of fifty enlisted men, while on special duty at the Columbian Exposition, Chicago, for a period of six months.

I have taken the prices of rations as they obtain at all of the different posts for the present fiscal year as my basis in formulating the estimate.

*Military stores.*—The increase in the amount for this item is caused by the proposed establishment and maintenance of target ranges and the hiring of ranges.

*Transportation and recruiting.*—The increase asked for under this head is necessary to meet the expenses connected with several additional recruiting rendezvous which it is proposed to establish.

*Repair of barracks.*—In the naval appropriation bill, approved July 19, 1892, the sum of \$3,000 was included "for the erection of a marine barracks at the naval station at Port Royal, S. C." Under the auspices of the Bureau of Yards and Docks, Navy Department, plans and specifications were prepared upon which to erect a suitable building at the above-named station. These having received the approval of this office, the commandant of the Marine Corps, and the Navy Department, advertisements in the newspapers were published, and on the 22d of August, 1892, bids were publicly opened for the erection of said barracks, the lowest regular bid received being for the sum of \$5,600.

As the plans and specifications adopted are not too large for a building suitable for the purpose, I have included the sum of \$2,600 as an additional amount required to be appropriated before readvertising for proposals.

The enlisted men now on duty at Port Royal are not suitably quartered, and I trust this additional sum may be made available at once.

The item of \$15,000 "for the erection of a marine barracks on Coster Harbor Island, Newport, R. I.," is made imperative, if marines are to be continued on the duty they have been performing there during the last few years.

Your attention is respectfully called to the appended letter (marked A) from the Chief of the Bureau of Navigation, U. S. Navy, and the one of Lieut. Randolph Dickins, the officer commanding marines on board the U. S. S. *Richmond*, and those serving on shore at Coster Harbor Island (marked B), the latter approved by Capt. Bunce, U. S. Navy, both referring to this subject. The appropriation should be made available at the earliest possible moment.

*Forage.*—The rates at which forage was contracted for, present fiscal year, are slightly in advance of those of the previous year. I have taken this year's prices as my basis in the estimate for 1893-'94.

*Contingencies.*—The increase of \$2,500 under the above head is imperative.

The gas and water pipes at all the barracks (save Norfolk, Va.) must be taken up and new ones laid. They have been in use for thirty years, and have become so rusted and leaky as to cause such an increase in gas and water bills that the sum of \$9,000 is required annually to meet this expense.

This amount is one-third larger than it should or would be if new pipes were laid. It will cost about \$4,000 to renew these pipes.



Out of the amount appropriated for "Contingent," fiscal year ending June 30, 1892—namely, \$27,500, the sum of \$15,853.47 was expended for advertising, packing boxes, newspapers, books and periodicals; gas, water, straw, per diem, laundry work, stationery, freight and cartage, post-office boxes, and toll, and \$3,144 was consumed in procuring articles under contract, but chargeable to said appropriation, leaving but \$8,502.44 to meet all and every emergency that may arise at eleven posts, as well as certain expenses in connection with the different guards at sea.

These are regular annual expenses that are created with a degree of certainty that can not be doubted.

The sums heretofore appropriated have never met the proper demands made upon them, and only by the most parsimonious economy have we been able to get along; and even under these circumstances deficiencies have annually been created and additional appropriations been asked from Congress to meet them.

Very respectfully, your obedient servant,

H. B. LOWRY,

*Major and Quartermaster, U. S. Marine Corps.*

The COLONEL COMMANDANT U. S. MARINE CORPS,

*Headquarters.*

A.

BUREAU OF NAVIGATION, NAVY DEPARTMENT,

*Washington, August 17, 1892.*

SIR: Replying to your letter of the 16th instant, the following is an extract from the report of the commanding officer of the training station, Newport, R. I., recommending the construction of barracks for the marine guard at that station:

"The marine guard maintains with its small number (40) more posts than are maintained at the navy-yard at Portsmouth, Boston, Washington, or the Naval Academy. From lack of quarters a part of this guard has for nearly three years lived in tents, the only body of troops that has been obliged to endure the rigors of a New England winter in camp. The pressing needs of the station will force the whole guard to remain in tents during the coming winter. I renew my estimate of last year for quarters for these men."

The Bureau hopes that you will be successful in obtaining the appropriation for this purpose.

Very respectfully,

F. M. RAMSAY,

*Chief of Bureau.*

MAJOR AND QUARTERMASTER U. S. MARINE CORPS,

*Headquarters, U. S. Marine Corps, Washington, D. C.*

HEADQUARTERS, U. S. MARINE CORPS,

COMMANDANT'S OFFICE,

*August 18, 1892.*

Forwarded,

AUG. S. NICHOLSON,

*Major and Adjutant and Inspector, Acting Commandant.*

B.

U. S. S. RICHMOND,

*Newport, R. I., August 12, 1892.*

SIR: I would respectfully call your attention to the necessity of building barrack for the marines stationed on Coster Harbor Island, Newport, R. I. The marines here are only considered as part of the guard of the U. S. S. *Richmond*, and no adequate provisions for quarters have been made for them, and for the past three years they have been living upon the island in tents. As nearly all the apprentices live on the island, the necessity of having more marines there than on the ship is very apparent, and is shown by the distribution of the small force here. There is but one post kept up on the ship, the duties of which are combined in those of the orderly at the cabin door and corporal of the guard.

On the island there are seven, and even that number is insufficient to guard the large water front and maintain discipline among the hundreds of apprentice boys there.

The distribution is as follows: Post No. 1, corporal of the guard, stationed at main gate and causeway leading to the city. His duties are those of a regular corporal of the guard at a navy-yard, seeing that no unauthorized persons or things leave

the island or are brought upon it. As there is no sentry on that post with him, he must cover the post while he is posting sentinels, etc. Post No. 2, is the captain's orderly, and attends to telephone. Post No. 3 is on the brig. Post No. 4 is on a narrow neck of land leading to the gymnasium, where the boys are berthed, to see that none of them are leaving the building by that side after hours, or no unauthorized person enters it. No. 5 is on the upper floor of the gymnasium to see that the bags and hammocks are not disturbed and maintain order there. No. 6 is on the lower floor of the gymnasium to maintain order there and see that nothing wrong goes on in the water-closet. No. 7 is a patrol on the dock at the east side of the gymnasium to see that no one disturbs the boats and that no unauthorized persons leave the station or land upon it from that point. It is not practicable for the marines to live and mess on the ship and do duty on the island, as the ship is moored half a mile from the island, and at times during the winter it is impossible for boats to land alongside of the ship owing to the rough weather. In view of these facts, I would respectfully urge the need of having suitable quarters erected on the island for the accommodation of the men.

I am, sir, very respectfully, your obedient servant,

RANDOLPH DICKINS,  
First Lieutenant, U. S. Marine Corps, Commanding Guard.

Maj. H. B. LOWRY,  
Quartermaster U. S. Marine Corps, Headquarters, Washington, D. C.

COMMANDANT'S OFFICE,  
U. S. NAVAL TRAINING STATION,  
Newport, E. I.

Approved and forwarded. A report and estimate for marine barracks to cost \$15,000 has been recently forwarded by me to the Bureau of Navigation, Navy Department, the report stating the necessity of the case.

F. M. BURGE,  
Captain, U. S. Navy, Commandant.

HEADQUARTERS U. S. MARINE CORPS,  
QUARTERMASTER'S OFFICE,  
Washington, D. C., October 11, 1892.

SIR: In obedience to your order of the 10th instant, I inclose a triplicate copy of the estimates submitted to you, accompanied by a letter from this office, under date of September 3, 1892.

In preparing a supplementary estimate for the support of the additional 974 enlisted men, I have taken as my basis the prices of articles, so far as may be possible, as established by contracts, or by open purchases made, present fiscal year.

*Clothing.*—The annual cost of clothing (first year of enlistment) per capita is \$38.16; 974 men at \$38.16 is \$37,167.84.

*Rations.*—As about one-half of the additional number of men will be at sea, I have estimated for 487 men. At the average cost of rations, as obtained under contract—i. e., \$21.53 per capita—487 men at \$21.53 cents is \$38,270.65. Fuel is estimated for under the same conditions as for "provisions;" 1,119 cords of wood at \$7.46 per cord is \$5,449.53.

An additional quantity of "military stores," such as knapsacks, blanket-bags, gunslings, and ammunition, will be required, the cost of which I estimate to be about \$4,967.40.

The additional demands upon the "contingent" appropriation for the items enumerated under the head of "contingencies" will not be less than \$5,000.

Very respectfully, your obedient servant,

H. B. LOWRY,  
Major and Quartermaster, U. S. Marine Corps.

The COLONEL COMMANDANT, U. S. MARINE CORPS,  
Headquarters.

[First indorsement.]

HEADQUARTERS U. S. MARINE CORPS,  
Washington, D. C., October 15, 1892.

Respectfully referred to the Secretary of the Navy, in connection with estimates inclosed herewith.

CHARLES HEYWOOD,  
Colonel Commandant, U. S. Marine Corps.

*Estimates of appropriations required for the service of the fiscal year ending June 30, 1894,  
by the Quartermaster's Department, U. S. Marine Corps.*

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1893.
<b>PROVISIONS.</b>			
For 1,100 noncommissioned officers, musicians, and privates, and for commutation for rations to 11 enlisted men detailed as clerks and messengers, also for payment of board and lodging of recruiting parties .....	\$88,402.44		
For amount required to be transferred to paymaster Marine Corps on account of rations to retired men .....	5,256.32	\$93,658.76	\$71,188.63
NOTE No 1.—The commutation in lieu of rations in kind, at the rate of \$1.75 to those enlisted men, also commutation of quarters, at \$21 and \$10 per month, authorized by order of the Navy Department dated June 20, 1880, and July 30, 1885.			
NOTE No. 2.—There are 64 retired enlisted men at this date.			
<b>CLOTHING.</b>			
For 2,100 noncommissioned officers, musicians, and privates .....		75,000.00	75,000.00
<b>FUEL.</b>			
For heating offices, barracks and quarters, for ranges and stoves for cooking, fuel for enlisted men, and for sale to officers .....		19,500.00	19,500.00
<b>MILITARY STORES.</b>			
For pay to chief armorer, at \$3 per day, 3 mechanics, at \$2.50 each per day, in all .....	3,280.50		
For purchase of military equipment, such as cartridge-boxes, bayonet, scabbard, haversack, blanket bags, knapsacks, canteens, musket-slugs, swords, drums, trumpets, flags, waist belts, waist plates, cartridge belts, spare parts for repairing muskets, purchase of ammunition, purchase and repair of instruments for band, purchase of music and musical accessories, medals for excellence in gunnery and rifle practice, good conduct badges, incidental expenses in connection with the school of application, for the establishment and maintenance of targets and ranges, for hiring established ranges, for procuring, preserving, and handling ammunition, etc .....	10,714.00	14,000.50	13,280.50
<b>TRANSPORTATION AND RECRUITING.</b>			
For transportation of troops and expenses of the recruiting service .....		15,000.00	14,000.00
<b>REPAIR OF BARRACKS.</b>			
At Portsmouth, N. H., Boston, Mass., Brooklyn, N. Y., League Island, Pa., Annapolis, Md., headquarters and Navy yard, Washington, D. C., Norfolk, Va., Pensacola, Fla., Mare Island, Cal., Port Royal, S. C., and Sitka, Alaska, and per diem for enlisted men employed under the direction of the Quartermaster's Department on the repair of barracks and other public buildings .....	10,000.00		
For rent of building used for manufacture of clothing, storing supplies, and office of the assistant quartermaster, Philadelphia, Pa .....	2,000.00		
To complete the erection of the barracks at Port Royal, S. C., to be immediately available .....	2,600.00		
For the erection of a marine barracks at Coasters Island harbor .....	15,000.00	29,600.00	19,512.00
<b>FORAGE.</b>			
For forage in kind for five horses of the Quartermaster's Department and the authorized number of officers' horses .....		3,000.00	2,800.00
<b>HIRE OF QUARTERS.</b>			
For hire of quarters for officers serving with troops where there are no public quarters belonging to the Government, and where there are not sufficient quarters possessed by the United States to accommodate them .....	4,500.00		



*Estimates of appropriations required for the service, etc.—Continued.*

Detailed objects of expenditure, and explanations.	Estimated amount which will be required for each detailed object of expenditure.	Total amount to be appropriated under each head of appropriation.	Amount appropriated for the current fiscal year ending June 30, 1893.
<b>HIRER OF QUARTERS—continued.</b>			
For hire of quarters for 7 enlisted men employed as clerks and messengers in Commandant's, Adjutant and Inspector's, Paymaster's, and Quartermaster's offices, Washington, D. C., and Assistant Quartermaster's Office, Philadelphia, Pa., at \$21 each per month .....	\$1,764.00		
Hire of quarters for 3 enlisted men employed as above at \$10 each per month .....	360.00	\$6,624.00	\$6,624.00
<b>CONTINGENT.</b>			
For freight, forage, tolls, cartage, funeral expenses of marines, stationery, telegraphing, rent of telephones, purchase and repair of type-writers, apprehension of deserters and stragglers, per diem of enlisted men employed on constant labor for a period not less than ten days, repairs of gas and water fixtures, office and barracks furniture, mess utensils for enlisted men, such as bowls, plates, spoons, knives and forks, packing boxes, wrapping paper, oil cloth, crash, rope, twine, camphor and carbonized paper, carpenter's tools, tools for police purposes, iron safes, purchase and repair of public wagons, purchase and repair of harness, purchase of public horses, purchase and repair of hose, repair of fire extinguishers, services of veterinary surgeons and medicines for public horses, purchase of fire hand grenades, purchase and repair of carts and wheelbarrows, purchase and repair of cooking stoves, ranges, stoves and furnaces where there are no grates, purchase of ice, towels, and soap for offices, postage stamps for foreign postage, purchase of books, newspapers, and periodicals, improving parade grounds, repair of pumps and wharves, laying drain, water, and gas pipes, water, introducing gas, and for gas, oil, and maintenance of electric lights, straw for bedding, mattresses, mattress covers, pillows, wire bunk bottoms for enlisted men at the various posts, furniture for Government houses and repair of same, and for all emergencies and extraordinary expenses arising at home or abroad, but impossible to anticipate or classify—in all .....		30,000.00	27,500.00
		286,383.26	249,411.13

## SUPPLEMENTARY ESTIMATE.

## ADDITIONAL 974 NONCOMMISSIONED OFFICERS, MUSICIANS, AND PRIVATES.

Detailed objects of expenditure, and explanations.	Total amount to be appropriated under each head of appropriation.
<i>Provisions.</i>	
For 487 noncommissioned officers, musicians, and privates, 365 days is 177,755 rations, at \$21.53 per ration .....	\$38,270.65
<i>Clothing.</i>	
For 974 noncommissioned officers, musicians, and privates .....	37,167.84
<i>Fuel.</i>	
For 487 noncommissioned officers, musicians, and privates .....	5,449.53
<i>Military stores.</i>	
For purchase of cartridge boxes, bayonet scabbards, haversacks, blanket bags, canteens, musket slings, etc., for 974 men .....	4,907.40

## SUPPLEMENTARY ESTIMATE—Continued.

Detailed objects of expenditure, and explanations.	Total amount to be appropriated under each head of appropriation.
<i>Transportation and recruiting.</i>	
For transportation of troops and expenses of the recruiting service.....	\$6,954.36
<i>Contingent.</i>	
For freight, ferriage, cartage, barrack furniture, etc.....	5,000.00
	97,809.78

HEADQUARTERS U. S. MARINE CORPS,  
QUARTERMASTER'S OFFICE,  
Washington, D. C., November 2, 1892.

SIR: I respectfully inclose herewith abstracts of proposals for supplies U. S. Marine Corps, received by this office in response to its advertisement dated April 27, 1892.

Very respectfully,

H. B. LOWRY,

Major and Quartermaster, U. S. Marine Corps.

The COLONEL COMMANDANT,  
U. S. Marine Corps, Headquarters.

*Schedule of proposals received for supply of rations for the Marine Corps for the year 1892-'93, under advertisement from the quartermaster's office, dated April 27, 1892.*

Names of contractors.	Portsmouth, N. H.	Charlestown, Mass.	Brooklyn, N. Y.	Philadelphia, Pa.	Washington, D. C.	Gosport, Va.	Annapolis, Md.	Fort Royal, S. C.	Cal.	Sitka, Alaska.
Andrew Koch .....			\$15.51							
John Mullett .....		\$28.00								
James Brownlie .....									\$19.00	
J. T. Parker & Bro						\$16.14				
Thos. J. Barlow .....						*15.30				
W. E. Campbell .....								\$27.50		
G. Ahren's Sons .....			16.00							
J. E. Orr .....			*14.97							
M. L. Kelly .....									*17.74	*\$31.00
Frank Hume .....				\$27.12	\$24.73	24.73	\$25.73			
J. B. Bryan .....					25.62					
J. C. Ergood & Co.				26.90	25.29		26.49			
D. V. Miller .....							*17.50			
J. E. Chase .....	\$18.98									
H. A. Yeaton & Sons	*18.19									
D. C. Norton & Co.	21.49									
Chas. A. Simonds .....		27.40								
M. J. Doran & Co.	23.75	*23.75	23.75	*23.75						
Jno. Davis & Son .....		24.00								
C. S. Hewlett .....			15.00							
W. H. Belford .....	21.23		15.37							

\* Accepted.

*Schedule of proposals received for supply of wood and coal to the Marine Corps, under advertisement from quartermaster's office, dated April 27, 1892.*

Names of bidders.	Where to be delivered.	Wood—per cord.			Coal—per ton.					
		Oak, in stick.	Pine, in stick.	Pine (kindling), sawed and split.	Red ash (egg).	Red ash (stove).	White ash (egg).	White ash (stove).	White ash (furnace).	White ash (tunt).
J. Z. Williams .....	Officers and officers' quarters, Washington and Georgetown, D. C., and within 1 mile of limits of said cities.	*\$5.25	*\$5.00	*\$6.00	*\$5.75	*\$5.90	*\$5.30	*\$5.35	*\$5.30	*\$5.30
V. B. Johnson .....	do	6.94	6.70	7.50	6.45	6.60	6.20	6.35	6.10	6.10
J. Z. Williams .....	Marine Barracks and navy-yard, Washington, D. C.	*5.00	*5.00				*5.20	*5.35	*5.20	*5.20
V. B. Johnson .....	do	6.60	6.44		6.20	6.35	5.95	6.10	5.85	5.85
G. L. Sheriff .....	do			7.25			5.39		*5.19	
J. J. Convery .....	Officers and officers' quarters and rendezvous, Philadelphia, Pa.	*7.35		*8.35		*5.14	*4.99			
J. S. M. Basil .....	Marine Barracks, Annapolis, Md.	*4.37	*3.87	*5.44		*5.64	5.39	5.54		
H. B. Myers .....	do	4.45	3.95	5.45		5.90	*5.30	*5.45		
Neimyer & Bridges .....	Officers' quarters, Norfolk, Va.	6.00					6.35			
D. S. Wells .....	do							6.38		
W. G. Parker .....	do	*5.00						*6.25		
Neimyer & Bridges .....	Marine Barracks, Norfolk, Va.	6.00	6.00					5.83		
D. S. Wells .....	do							6.38		
W. J. Parker .....	do	*5.00	*5.00					*5.70		
D. S. Wells .....	do						6.71		6.71	
E. P. Spinney .....	Marine Barracks, Portsmouth, N. H.	*6.90								
S. G. French .....	do	7.50					6.42		6.42	
W. H. Sise .....	do						7.25		7.25	
C. E. Walker & Co. ....	do	8.00					*6.40		*6.40	
D. S. Wells .....	Marine Barracks, Charlestown, Mass.						6.41	6.41	6.41	6.41
J. J. Convery .....	do						7.50	7.50	7.50	7.50
J. E. Lewis & Co. ....	do	*8.50	*6.00	*9.00			6.40	6.40	6.25	6.20
S. G. French .....	do						6.52	6.72	6.42	6.52
C. A. Campbell .....	do	9.00	8.00	9.00			*6.10	*6.38	*5.82	*6.10
D. Duncan & Son .....	Marine Barracks, Brooklyn, N. Y.						4.95			4.95
Peal, Peacock & Co. ....	do						5.34			5.24
S. G. French .....	do	*8.98	*8.98	*9.12			*4.58			*4.58
Barber & Zeigler .....	do						4.64			4.64
D. S. Wells .....	do						4.71			4.71
J. J. Convery .....	do						5.74			5.74
Do .....	Marine Barracks, League Island, Pa.	*12.00	*12.00				6.00	6.21		6.21
Peal, Peacock & Co. ....	do						5.99	5.99		5.99
S. G. French .....	do						*4.98	*5.34		*4.98
Aden Bros. ....	Marine Barracks, Mare Island, Cal.	*8.94	*8.94	10.00			*13.00			
H. Rosenfield .....	do						13.24			
S. G. French .....	do						17.24			

\* Accepted.

*Schedule of proposal for supplies for the Marine Corps under advertisement inviting proposals, dated April 27, 1892.*

Name of bidder.	Class.	Amount.
The University Manufacturing Company	2	\$800.00
H. Breuninger	2	"900.00
G. F. Roedel	1	8,400.00
W. H. Wiley & Son	1	"110.00
Watsontown Boot and Shoe Company	1	*8,160.00
B. Rich & Sons	1	*4,533.00
H. T. Kent	1	*28,404.00
Horstmann Bros. & Co	1, 2, 3, 4	*12,240.00
Thomas G. Hood	1, 2, 3	*8,549.94
W. F. Bernstein	1	*1,216.50
Louis Sichel	1	766.00
Paul J. Field, Jr.	4	*555.57
F. W. Allison	4	*618.75
R. Wurlitzer	2	235.00
Hartford Woven Wire Mattress Company	1	645.00
Hans Hemker	1, 3	3,890.27
Lyons Bros	1	*936.00
John R. Emsley	1	450.04
H. C. Harper	1, 2, 3	*4,142.00
B. Y. Pippey & Co	1	*37,429.50
Manhattan Supply Company	1, 3, 4	*6,611.55
R. Lerick's Son & Co	1	*470.00
W. Wolforth	1	*638.00
E. E. McKnight	1	9,720.00
H. F. Bowen	1	475.00
M. H. Marcus & Bro	1	690.00

\*Accepted for part of class.

# REPORT OF MAJ. R. W. HUNTINGTON, COMMANDING MARINE DETACHMENT, SANDY HOOK.

MARINE BARRACKS,  
Brooklyn, N. Y., October 11, 1892.

SIR: I have the honor to report that on the 14th ultimo, in obedience to orders received from the commandant of this navy-yard, dated September 13, I proceeded by tug *Traffic*, in command of a detachment consisting of Capt. F. H. Harrington, First Lieut. C. G. Long, and 56 enlisted men, to Camp Low, Sandy Hook, and there relieved Capt. S. Mercer from command. He, with First Lieuts. C. A. Doyen and B. S. Neumann, Assistant Surgeon Henry La Motte, U. S. Navy, and 61 enlisted men, remained there under my command.

Capt. Mercer had encamped his men on the line of the railroad, about 500 yards west from the end of the wharf upon which the buildings of Camp Low are partly placed. I approved his selection of site for camp and put my men under canvas there. The 15th and 16th September were fully occupied in arranging the camp. On the 17th a detachment, consisting of Capt. M. C. Goodrell, Second Lieuts. J. Prochazka and R. McM. Dutton, with 83 enlisted men, reported for duty, and were tented alongside the railroad. The command was then organized as follows:

Maj. R. W. Huntington, commanding; First Lieut. B. S. Neumann, adjutant and quartermaster; Assistant Surgeon Henry La Motte, U. S. Navy, surgeon; Sergeant A. Bernstein, S. M. and Q. M. sergeant; Company A, Capt. F. H. Harrington, First Lieut. C. G. Long; Company B, Capt. M. C. Goodrell, Second Lieut. R. McM. Dutton, Second Lieut. J. Prochazka; Company C, Capt. S. Mercer, First Lieut. C. A. Doyen, and to each company about 67 enlisted men.

Our camp was named Camp Henry Erben, in honor of the commandant of this navy-yard.

On the 18th emigrant passengers to the number of about 900 were landed at Camp Low, and we communicated with them by telephone, considering them as in quarantine. From that day to the 28th of September there continued to be a number of passengers held at Camp Low, and our sentinels prevented egress from that camp. The daily guard consisted of one company. The main guard was at our camp, and an outpost, consisting of the officer of the guard, 2 sergeants, 3 corporals, and 18 privates was tented north of Camp Low. This guard was connected with our camp by a plank walk across a water course through the swamp. The walk and bridge were built, in the first instance, by Lieut. Neumann. The tide rising higher than we had expected, the whole walk was made into a footbridge by Capt. F. H. Har-

rington. This bridge very materially shortened our line of sentinels. The line was, as thus established, about 900 yards long.

The passengers landed were emigrants, and no trouble was experienced in keeping them from wandering. It was sufficient in every instance for the sentinels to indicate that they had orders to fire upon persons persisting in advancing toward our line, to make them fall back. Eleven posts over Camp Low were kept. This guard would in any case be found enough to restrain steerage passengers. Probably cabin passengers would be harder to handle.

During the stay of the emigrants at camp there were a few cases of cholera, of which only one was fatal.

The battalion was frequently drilled, although the ground is poorly adapted for drill, and the woods are full of poison oak. Twenty rounds of ball cartridge per man were expended in target practice, with fair results. No extended range was practicable on account of the lay of the land and the ordnance proving ground. The men were comfortably tented. In addition to the tents we took with us, others were borrowed from Camp Low, so the men had more than regulation space. The tents were well floored. Floors for our tents were made at the navy-yard, and for those tents we borrowed lumber was also given from Camp Low. Our thanks are due to the officials there for many acts of kindness. Kitchens were built by the companies. The third company used, as mess room and kitchen, a house belonging to the railroad company.

The supply of water was from pipe wells pumped by steam into the tank formerly used by the locomotive engines. We furnished Camp Low with water. Private James McGantlin, of the guard of the U. S. S. *Atlanta*, who, a short time ago, for some weeks was waiting discharge (bad conduct) in these barracks, under sentence of summary court martial, ran the pump and engine and did honest and valuable service.

On the 18th Capt. F. L. Denny, assistant quartermaster, reported for duty, and was ordered to attend to the purchase and shipment of necessary stores in New York and Brooklyn. This duty he did well. The rations of the men were uniformly good. Occasional issues of fresh beef and bread were made as opportunity allowed.

Quarantine against the whole Sandy Hook reservation was declared by the authorities of New Jersey. Dr. Woodward, of the State board of health, who was in charge of this quarantine, proved himself a kind-hearted and reasonable man, and placed no unnecessary restrictions upon our intercourse.

Through his kindness we received occasional supplies and mail by railroad train. The sick list was generally very small. There was a slight epidemic of diarrhoea when we were first in camp, due probably to the change in the manner of living from barracks to camp. Several men were disabled for a time by oak poisoning.

On the 21st Private Joseph McMahon, of the *Vermont's* guard, died from purpura hæmorrhagica. He was buried on the right side of the railroad, going toward the main land, on the 22d. On the 28th Second Lieut. Julius Prochazka was transferred to the naval hospital, Brooklyn, with typhoid fever. The battalion was withdrawn on the 5th of October, with the exception of First Lieut. C. G. Long and 11 enlisted men. These were withdrawn on the 8th.

The conduct of the enlisted men was very good generally. The guard duty was done carefully and absolutely well.

The officers were attentive and zealous in performance of duty. I consider that Capt. F. H. Harrington and First Lieut. B. S. Neumann deserve special mention for the energy and intelligence they showed.

I am, very respectfully, your obedient servant,

R. W. HUNTINGTON,  
Major U. S. Marine Corps, Commanding Marines.

The COLONEL COMMANDANT, U. S. MARINE CORPS,  
Washington, D. C.

[First indorsement.]

COMMANDANT'S OFFICE,  
Navy-Yard, New York, October 13, 1892.

Respectfully forwarded, with special commendation to the officers and men of the command for their alacrity in preparing for the service, and for the very efficient and cheerful manner in which they performed this service.

HENRY ERBEN,  
Commodore U. S. Navy, Commandant, Navy-Yard and Station.

**REPORT OF CAPT. D. P. MANNIX, COMMANDING SCHOOL OF APPLICATION.**

HEADQUARTERS SCHOOL OF APPLICATION, U. S. MARINE CORPS,  
*Marine Barracks, Washington, D. C., October 1, 1892.*

SIR: In compliance with paragraph 13, General Order No. 1, Headquarters U. S. Marine Corps, series of 1891, I have the honor of making the following report of the operations of the School of Application of the United States Marine Corps for the past year, the first of the existence of the school:

The School of Application of the U. S. Marine Corps was established at the headquarters of the corps by General Order No. 1, Headquarters U. S. Marine Corps, May 1, 1891, with the view of supplying a want long felt by the corps for a school of practice, by which it might be enabled to keep pace with the progress made in the methods of warfare, and thereby insure for the Navy greater utility and continued efficiency on the part of its military arm for all duties it might be called upon to perform, ashore or afloat, in peace or war, requiring the disciplined soldier, the skilled marksman, and the expert artillerist.

It was the intention also that this school should supplement the course of the Naval Academy by instruction of the academic graduates assigned to the Marine Corps in the administrative and military duties of the corps. They are, therefore, sent here when assigned to the corps, for instruction before joining other stations.

The headquarters of the corps has special advantages not possessed by any other place for a school of practice. Here student officers and men are comparatively free from the care of guard duty, except so much as may be necessary for instruction, and in consequence display more interest in their drills and studies and have more time to devote to them. The naval experimental ground for ordnance at Indian Head is of easy access, as is the naval magazine with its excellent range for target practice, and a few miles back of the Potomac's eastern branch the country is well adapted for field training. The navy-yard and gun foundry are conveniently at hand, combining a water front admirably suited for instruction in boat pulling and sailing, with the advantages afforded by the gun shops of acquiring a practical knowledge of the manufacture of guns, carriages, etc., not to be obtained elsewhere.

The school has also the services of the corps band, which it could enjoy at no other station, and it has moreover at headquarters the personal care and supervision of the commandant of the corps.

**PROGRAMME OF INSTRUCTION.**

The school has two divisions, one for commissioned officers and one for enlisted men.

**DIVISION FOR COMMISSIONED OFFICERS.**

or the purpose of administration and convenience in instruction the course is arranged into departments as follows:

- I. Department of Infantry.
- II. Department of Artillery.
- III. Department of Administration and Sea Service.
- IV. Department of Law.
- V. Department of Torpedoes.
- VI. Department of Engineering.
- VII. Department of Military Art.

The course in each department is both practical and theoretical, preference being given to the former wherever it is possible to do so.

The class of student officers report for instruction and duty September 1 of each year. Five days are allowed to settle and arrange their affairs. The instruction then commences in the department of infantry.

**DEPARTMENT OF INFANTRY.**

The course of infantry is divided into four parts, embracing the drill instructions, guard duty, small-arms firing regulations, and infantry fire discipline, and consists of recitations, drills, problems, and field exercises.

**DETAILED PROGRAMME OF STUDIES.****Part I.—Infantry drill instructions.**

Definitions; general regulations; school of the squad; school of the company; school of the battalion; evolutions of the brigade; extended order drills; formation for street riots; ceremonies; signals.

*Part II.—Guard duty.*

Rosters; the officer of the day; the officer of the guard; the sergeant of the guard; the corporal of the guard; the soldier on guard; orders for sentinels on post.

*Part III.—Small-arms firing regulations.*

Care of rifle; nomenclature; dismounting and assembling; sighting drills; position and aiming drills; gallery practice; general regulations for range practice; details for individual practice; suggestions for riflemen; skirmish firing; volley and file firing; targets; ranges; marking and scoring; classification; motion of bullets; variations in the trajectory; the trajectory as affected by atmospheric conditions; the effects of fire; measuring distances by pacing; estimating distances by sight; estimating distances by sound; pistol practice.

*Part IV.—Infantry fire discipline.*

Long-range *versus* short-range fire; supply of ammunition on the battlefield; observations on supplying ammunition; uncontrolled and controlled fire; advantages and disadvantages of controlled and uncontrolled fire; fire discipline and the control and direction of fire.

1. The distance at which fire should be opened and the number of cartridges to be used to attain a definite object;
2. Determination of the force required;
3. On choice of ground;
4. The selection of the objects;
5. Determination of range, sights;
6. The kind of fire to be used; advantages and disadvantages of mass and volley firing;
7. On the intensity;
8. On the attitude of the men;
9. The observation of results;
10. When men in movement may fire;
11. Number of rounds to be fired at each halt;
12. When the bayonet should be fixed; fire units. *Résumé.*
13. Tactical deductions.

## DEPARTMENT OF ARTILLERY.

The course of artillery is divided into two parts, embracing artillery drill instruction and naval gunnery, and consists of recitations, drills, and practical exercises.

## DETAILED PROGRAMME OF STUDIES.

*Part I.—Artillery drill instructions.*

General rules; school of the section, horsed, and with the drag; school of the battery.

*Part II.—Naval gunnery.*

Care, nomenclature, and description of guns, carriages, mounts, and gun implements; drills of main and secondary batteries; dismounting and assembling the mechanism of machine and rapid-fire guns; description and mode of manufacture of projectiles; charges, fuses, and primers; the theory and practice of pointing; explanation of sights, concentration of fire, and when to use the various kinds of projectiles; employment against torpedo boats and in field service; mounting and dismounting; subcaliber practice; exterior ballistics; the practical use of instruments in determining pressure, velocity, time of flight, and range.

## DEPARTMENT OF ADMINISTRATION AND SEA SERVICE.

The course in administration and sea service is divided into two parts, military administration, and sea service, and consists of lessons and exercises in application.



## DETAILED PROGRAMME OF STUDIES.

Part I.—*Military administration.*

General principles of administration in the U. S. Marine Corps; the system of recruitment; the system of purchases; care of property and supplies; system of accountability for money and property; transportation of men, munitions, and supplies by rail, steamer, or wagon; military and naval regulations; orders; reports; correspondence in general, and returns.

Part II.—*Sea service.*

Embarking and disembarking; interior discipline; care of small-arms and accoutrements; routine; mess arrangements; official intercourse; military etiquette; duties of non-commissioned officers; special duties of first sergeant, of non-commissioned officer on guard, of orderlies, and of sentinels; nomenclature of ships; parts and fittings of boats; boat-pulling and sailing; swimming; slinging and lashing hammocks; making knots, splices, and hitches, and the application of pulleys, blocks, and tackles.

## DEPARTMENT OF LAW.

For the present the course of law is limited to one part, military law and courts-martial, and consists of lessons supplemented by lectures.

## DETAILED PROGRAMME OF STUDIES.

Military law proper; the subject defined and divided; constitutional provisions; the written military law; the unwritten military law; the court-martial; the constitution and composition of general courts-martial; the jurisdiction of general courts-martial; the procedure of general courts-martial; arrest; the charge; assembling and opening of the court; the president and members; the judge-advocate; challenges; organization; arraignment, pleas and motions; the trial; evidence; the finding; sentence and punishment; action on the proceedings; the reviewing authority; summary courts-martial; courts of inquiry.

## DEPARTMENT OF TORPEDOES.

The course of torpedoes is divided into four parts, torpedoes offensive and defensive, torpedo fuses, electricity, and explosives, and consists of lessons and exercises in application.

## DETAILED PROGRAMME OF STUDIES.

Part I.—*Torpedoes offensive and defensive.*

Description of the various kinds of torpedoes, mechanical and electrical, contact and ground, with their advantages and disadvantages, and how used offensively and defensively; name and use of the instruments and gear embraced in a ship's torpedo outfit; preparation of the service spar torpedo and contact gun-cotton torpedo for use; method of defending a harbor by torpedoes, and where the different kinds should be placed in the channel; how to find the size of charge, the depth at which effective, and the space between torpedoes; the strength of torpedo case, how tested and made waterproof; filling and planting torpedoes, and how the cables, buoys, etc., should be arranged during the operation; junction boxes and their use; how the cables should be introduced into the firing station; firing the torpedo, and how to determine the position of a vessel with reference to any ground torpedo; shutter apparatus; firing and observing arcs, and position finders; circuit closers and their use; nature of enemy's attack on torpedoes and how to defend them; improvised electrical and mechanical torpedoes; improvised circuit closers; description of various kinds of land torpedoes; the use and application of land torpedoes; torpedo boats; description of the Whitehead and Howell torpedoes; manner of discharging the Whitehead and Howell torpedoes.

Part II.—*Torpedo fuses.*

Mechanical and platinum wire fuses and detonating fuses for gun cotton; how made, tested, and used; the number of fuses necessary and their position in a charge of gunpowder or gun cotton.



**Part III.—Electricity.**

How electricity is produced; conductors and insulators; heating effect of currents; its general application to torpedo work; how applied to fire guns and for lighting purposes; how used in telegraphy and for ringing bells; the Leclanche and other batteries, how made and how taken care of; testing room instruments; the Wheatstone bridge and its practical use in measuring electrical resistance; electrical tests of cables for insulation, conductivity, and resistance.

**Part IV.—Explosives.**

Gunpowder: composition, kinds, manufacture, care; principles of explosion; size and form of grains.

High explosives: Gun cotton, nitro glycerine, dynamite, fulminates; how prepared, preserved, and used; peculiarities of each; effects of explosion; care necessary in handling.

**DEPARTMENT OF ENGINEERING.**

The course of engineering is divided into four parts: Topography, field engineering, signaling and telegraphy, military hygiene, and consists of lessons, lectures, and exercises in application.

**DETAILED PROGRAMME OF STUDIES.****Part I.—Topography.**

Construction of scales; copying, reducing, and enlarging plans; the conventional signs.

Terms used in describing hills; the representation of hills; the scale of horizontal equivalents.

Sections.

Making use of plans on the ground; measurement of distances; the plane table illustrated in intersection and resection.

The prismatic compass and the protractor; their uses illustrated in intersection and resection; the magnetic variation.

Traversing with compass and field book; plotting; traversing and plotting at sight.

Traversing with the plane table.

Hill and mountain sketching.

Sketching without instruments; general remarks on sketching.

Reading contoured plans.

Reconnaissance of a defensive position; sketch and report.

Sketching on horseback. The Vernier; the pocket sextant, adjustment and use; the theodolite, its construction and adjustment; levelling; trigonometrical surveying.

**Part II.—Field engineering.**

General principles and definitions; clearing the ground; hasty intrenchments; obstacles; defense of posts; field level and field geometry; deliberate intrenchments; field casemates; brushwood; revetments; working parties; siege trenches; roads; cordage and use of spars; bridges; floating bridges; camping arrangements; hasty demolition.

**Part III.—Signaling and telegraphy.**

Instruction in signaling and telegraphy as prescribed by General Order No. 380, Navy Department, January 2, 1890; use of flag and torch; use of signal disks in transmitting messages.

**Part IV.—Military hygiene.**

Definition: clothing; lodgment of troops; camps; bivouacs; exercise; cleanliness; water tests for the common impurities and methods for purification; early aid to the injured; the best and most expeditious manner of temporarily treating gunshot wounds, poisoned wounds, frost bite, bruises, dislocations, hemorrhage and fracture of bones; application of the tourniquet, and the most approved methods and mode of application in the restoration of the apparently drowned.

## DEPARTMENT OF MILITARY ART.

The course of military art is divided into three parts: Minor tactics, grand tactics, and strategy, and consists of lessons and exercises in application.

## DETAILED PROGRAMME OF STUDIES.

Part I.—*Minor tactics.*

General principles and definitions; security and information; reconnoitering duties; time and space; advanced guards and outposts; principles of attack and defense; employment of infantry; employment of cavalry; rear guards and marches; rivers and defiles; villages and woods; convoys; night attacks.

Part II.—*Grand tactics.*

General considerations upon tactics; its progress and epochs; division of armies into arms; infantry, its rôle, its armament, its tactical units, its formations, and maneuvers; cavalry, its rôle, its armament, its tactical units, formations, and maneuvers; artillery, its rôle, armament, tactical units, formations, and maneuvers; combined action of the three arms in battle.

Influence of the ground upon tactics; positions, their flanks, their front, their approaches, their interior, their rear, detached advanced posts, occupation of ground and proportion of troops to space, tactical marches and the element of time in military movements, orders of battle and engagements offensive and defensive, principal tactical combinations, different phases of battle, surprises, attack of strong places, and *coups de main*.

Part III.—*Strategy.*

Definition and object of strategy and general principles of warfare, system of operations, the theater of operations, bases of operations, strategic lines and points, fronts of operations, strategic fronts, lines of defense and strategic positions, lines of operations, strategic lines of maneuver, depot of supplies and their relation to marches, rôle and strategic importance of railways and telegraphs, marches of concentration, strategic front marches, forward and retreat, strategic flank marches, principal strategic combinations, indispensable conditions to be fulfilled by all strategic combinations, defense of frontiers and sea coasts by forts, etc.

## DIVISION FOR ENLISTED MEN.

*(Non-commissioned officers' school.)*

Non-commissioned officers and such privates as show sufficient aptitude are taught the theory and principles of the subjects outlined in the programme for their division, but the main object is to give them a thorough practical knowledge of these subjects.

All enlisted men are required to attend the course of practical exercises at the school. Attendance upon the course of studies in the division for enlisted men is compulsory only on the part of all non-commissioned officers.

The course of studies and of practical exercises for enlisted men proceeds with that of the commissioned officers.

## DETAILED PROGRAMME OF STUDIES.

The course for non-commissioned officers in infantry, artillery, administration and sea service and torpedoes is essentially the same as for the commissioned officers' division, and consists of recitations, lectures, drills, and field exercises.

## FIELD ENGINEERING.

The course of engineering is divided into five parts: Military sketching, elementary field fortifications, signaling, Military hygiene, preliminary course in mathematics, and consists of recitations, lectures, and exercises in application.

Part I.—*Military sketching.*

General principles; definitions; scales; comparative scales; diagonal scales; prismatic compass; plane table; field book; protractor; north point; finding true north; variation of compass; dip; plotting; eye sketching; contours; copying and enlarging; how to proceed to make a sketch with field book and prismatic compass.

Part II.—*Elementary field fortifications.*

General observations; nomenclature; normals for battle trenches, to fire standing, kneeling, and lying down; skirmishers' rifle pits; covering trenches; revetments; obstructions; wire obstructions; abatis; removal of obstructions; hasty demolitions; utilization of natural cover for defense; holes and sunken roads; embankments; hedges; plank and board fences; walls; making loopholes; defense of woods, buildings, farm yards, and villages.

Camping: To unpack, pitch, strike, and pack tents; telling off and exercise of cooking, latrine, water, ration, and wood parties. Construction of field kitchens and latrines, trenching of camp, and water supply.

Part III, *Signaling*, and Part IV, *Military hygiene.*

Same as for commissioned officers' division.

Part V.—*Preliminary course in mathematics.*

[Arithmetic, algebra, geometry, and trigonometry.]

The study of arithmetic, elementary algebra, geometry, and plain trigonometry for those not sufficiently proficient in these subjects.

## FIELD SERVICE.

The course of field service consists of lessons, drills, and field exercises, as follows:

General observations on field tactics; marches; reconnoitering; advanced guards; rear guards; outposts; attack and defense of positions.

*Text-books used at the School of Application, U. S. Marine Corps.*

## DIVISION FOR COMMISSIONED OFFICERS.

Departments.	Text books.
Infantry .....	Instructions for Infantry, U. S. Navy; Manual of Guard Duty; Blunt's Firing Regulations for Small Arms; Mayne's Infantry Fire Tactics.
Artillery.....	Instructions for Artillery, U. S. Navy; School of the Section, Light Artillery; Gunnery Drill-Book, U. S. Navy.
Administration and sea service.....	Accountability Instructions; Duties of Marines Embarked.
Law .....	Winthrop's Military Law and Courts-Martial; Instructions for the Administration of Law and Justice, U. S. Navy.
Torpedoes.....	Sleeman's Torpedoes; Spar Torpedo Instructions, U. S. Navy.
Engineering .....	Manual of Field Engineering; Richard's Military Topography; Notes on Signaling.
Military art.....	Shaw's Modern Tactics; Hamley's Operations of War.

## DIVISION FOR ENLISTED MEN.

Infantry .....	Instructions for Infantry, U. S. Navy; Manual of Guard Duty; Blunt's Firing Regulations for Small Arms; Batchelor's Infantry Fire, its use in battle.
Artillery.....	Instructions for Artillery, U. S. Navy; School of the Section, Light Artillery; Radford's Hand-Book of Naval Gunnery.
Administration and sea service.....	Accountability Instructions; Duties of Marines Embarked.
Torpedoes.....	Catechism of the Spar Torpedo, U. S. Navy; Catechism of Explosives, U. S. Navy; Notes on Submarine Mines.
Field engineering.....	Notes on Elementary Field Fortifications and Signaling; Davies' Practical Arithmetic, Elementary Algebra, Elementary Geometry.
Field service.....	Notes on Minor Tactics.

It has been found necessary to prepare notes and circulars at the school for use as text-books in some parts of the course of instruction. These notes and circulars are intended to meet such changes in the subject taught as will keep pace with the progress of the times and to embody only what is really needed. If the school was in possession of a medium-sized hand printing press and a small lithographic press, with means for doing photo-lithographic work, these professional notes and circulars could be disseminated throughout the corps.

The first class to take the course reported on September 1, 1891, and was assigned to duty in April last. Seven months was too short a period in which to accomplish all that it was desired to teach, but the lack of sufficient quarters at the post for officers and the appropriation for hire of quarters becoming exhausted, together with the demand from other stations for the services of officers, necessitated the limited time.

In addition to the drawback arising from want of time, the need of proper facilities for practical instruction was greatly felt. The class, however, was very attentive and zealous and showed great interest in the course. With the permission of Commodore Folger, chief of the bureau of ordnance, and the assistance of Commander O'Neil, inspector of ordnance at the navy-yard, and his assistant inspectors, the class availed itself of the advantages afforded by the gun shops in obtaining information regarding the manufacture of ordnance, etc., including the heating and assembling of gun hoops and jackets; boring guns and jackets; means of measuring expansions and interior and exterior diameters; rifling and sighting guns; different types of breech mechanism; gravity return carriages; methods of controlling recoil, of training and elevating, rapid-fire guns and carriages; banding projectiles; method of manufacture and inspection of primer tubes; the preparation of fuses and primers for issue; manufacture of De Bauge gas check pads, and of modern guns and carriages from the rough forgings as received from the manufacturers to the finished gun and gun-carriage.

The thoroughness of the instruction given the class was indicated in the parade, written, and oral examinations held before the board of examiners composed of the colonel commandant and Maj. H. B. Lowry, quartermaster of the corps. Written questions had been prepared covering the course, and when answered by the class were submitted to the board, who, as a further test of efficiency, assigned each officer selected questions from the list to answer orally and demonstrate at the blackboard.

The board was most favorably impressed with the proficiency displayed by the officers under instruction, as well in the parade and practical exercises as in the theoretical course. I append a copy of the questions for the written part of final examination, officers' division. The division for enlisted men has only been organized during the present year. The facilities for practical instruction are much better for the present class than they were for the last. During the year the Bureau of Ordnance and other bureaus of the Department gave strong proof of their interest in the advancement of the school.

Through the kindness of Commodore Folger and his great interest in all that tends toward the improvement of the service the school has been supplied with an excellent torpedo outfit from the torpedo station, including a liberal supply of the handbooks for seaman gunners on the spar torpedo and explosives, for the use of the non-commissioned officers' school, and with a quantity of drill cartridges from the Washington navy-yard for using caliber .45 ammunition with the 57-millimeter Hotchkiss gun. By direction of the Department the school has also been furnished with a condemned launch, No. 19, which has been refitted and answers very well for practical instruction in the spar torpedo and spar torpedo boat fittings. A small plat of ground at the post has also been utilized during the summer for an engineering camp, wherein have been constructed some model battle-trenches, rifle and gun pits, fascines, gabions, etc., with a short piece of wall, showing method of defense by loop-holing, notching, etc. This camp, although small, will aid materially the course of practical engineering in the construction of intrenchments, skirmishers' pits, gun pits, and in the principles of the defense of banks, hedges, ditches, and walls, also in the practical details of camping.

The school is still very much in need of a small supply of electrical, surveying, and drawing instruments, materials, etc. We have no fund upon which to draw for their purchase, and the school is dependent wholly upon such small sums as the quartermaster willingly lets us have when he can spare them from his contingent fund.

The personnel of the school consists of the commanding officer, who also commands the post, and three first lieutenants of the corps, who act as instructors. These officers continue to add to their knowledge, and consequently their effectiveness as instructors, the duties of which are laborious and important. During the first school term only one instructor, Lieut. Prince, was available. His services were most efficient and valuable. Dr. Dickson, U. S. N., of the post, also rendered valuable service to both divisions of the school by his interesting lectures on military hygiene and early aid to the injured.

The officers for instruction are those appointed from the naval cadets, graduates of the year, at the conclusion of their six years' course, to fill such vacancies as occurred during the year in the Marine Corps.

The garrison consists of the force of enlisted men ordinarily maintained at this post. The increased demand for marines on board ship and for duty at the other stations has rendered it impracticable to order a sufficient number to the school for instruction or to grant the requests of non-commissioned officers and privates who have applied for the privilege of going through the course. With even the ordinary small force the course is frequently and seriously interrupted during the year by the necessity of detaching for service elsewhere non-commissioned officers and men when only fairly started and interested in their studies.

At the present time all the available school force is rendering service at Camp Low, Sandy Hook, where it was dispatched on the 13th ultimo at forty minutes' notice.

The importance of such a school as this to the corps and the service and the advantage of an uninterrupted course are apparent to all.

But if the corps would reap the benefits of the school to the extent originally contemplated its enlisted force should be sufficiently increased to permit of at least one battalion of four instruction companies, thirty-two non-commissioned officers, and one hundred and twelve privates being assigned to the school, to be relieved only upon completion of the course and then replaced by an equal number.

It should be remembered that while undergoing training such a battalion would be ready at the hand of the Department for any temporary emergency. That such emergencies arise we know, and we know also that when they do the marines are always called upon to take a leading part.

It is time it was clearly perceived that the corps should be prepared to meet these sudden demands without unduly weakening the force engaged in guarding and protecting the public property at the navy-yards and stations throughout the country.

Very respectfully,

D. P. MANNIX,

*Captain U. S. Marine Corps, Commanding.*

The COLONEL COMMANDANT U. S. MARINE CORPS.

Approved October 15, 1892.

CHARLES HEYWOOD,

*Colonel Commandant U. S. Marine Corps.*

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[Order.]

HEADQUARTERS SCHOOL OF APPLICATION, U. S. MARINE CORPS,  
*Marine Barracks, Washington, D. C., March 25, 1892.*

The final examination of officers at the school of application, U. S. Marine Corps, will commence on Wednesday, March 30, and will proceed as follows, viz:

First. Maneuvers in infantry and artillery and practical exercises in torpedoes and field engineering, in accordance with the programme of instruction. At each gun the nomenclature, the drill, and the mechanical maneuvers belonging to it will be completed before proceeding to the next gun.

Second. The written examination. This part of the examination will be supplemented by such demonstrations at the blackboard and by such oral questions as may be deemed necessary by the board of examiners to determine the question of each officer's efficiency or deficiency.

In the written part of the examination the answer or demonstration to each question will be prefixed by the question. The whole will be written legibly and signed by the officer.

D. P. MANNIX,

*Captain U. S. Marine Corps, Commanding.*

THE WRITTEN PART OF FINAL EXAMINATION.

QUESTIONS.

I.—INFANTRY AND ARTILLERY.

1. Name the principal parts of the breech mechanism of the Springfield rifle.
2. Give the principles of aiming and define line of fire, line of sight, the natural line of sight, point blank, and artificial point blank, with sketch.
3. Give the formation of a company of infantry, and the posts of officers and non-commissioned officers in line, in column of sections, and of fours.

4. Give the formation in line of a battalion of four companies of infantry, with posts of officers and non-commissioned officers.
5. Give the rules for successive formations.
6. Having a battalion of infantry in line, name the different methods of forming it into column, and the methods of returning again into line.
7. Give general rules for evolutions of the brigade.
8. Give the rules for firing in extended order.
9. Describe the use of cover.
10. Give the battle formation of a company and the positions and duties of the officers.
11. Give the battle formation of a battalion, with general rules for the battalion in action.
12. Give general rules for formation for street riots.
13. How are distances measured by pacing, and how estimated by sight and by sound?
14. Give the manual for Colt's double-action navy revolver, with brief description of revolver practice.
15. What does a section of artillery comprise horsed, and with the drag?
16. Give the posts of the chief of section, the gunner, and the caisson corporal in line, column of platoons, column of sections, and files.
17. How are the gun detachments marched to the battery and posted?
18. How are the gun detachments marched from the battery?
19. Station the gun detachment at the drag and prepare the piece for action to the front.
20. Give the special duties of numbers 1 to 8, inclusive, at the Gatling when it is brought in battery.
21. Describe briefly the improved Gatling gun.
22. Give the words of command for a 37-millimeter Hotchkiss gun, mounted in place and lashed, as well as clamped against elevation and train, with the duties of a gun detachment of four men.
23. Explain how to dismount and reassemble the mechanism of the 37-millimeter Hotchkiss gun.

## II.—DUTIES OF MARINES EMBARKED.

24. Give a general outline of the duties of marines aboard vessels of war.
25. By whose orders are posts established, and through what official channels do sentinels receive their orders?
26. Under what circumstances are the members of a marine guard justified in acting as preservers of peace, though not acting under direct authority of a commissioned officer?
27. Through what official channel does an enlisted man make a request for redress in case of any real or imaginary injustice done him, and to whom does he make such appeal?
28. From whom do sentinels in charge of the brig receive orders in reference to the receiving or discharging of prisoners?
29. Where is the marine guard usually formed, and to whom does the officer report his guard at general quarters?
30. What are the stations and duties of the men at fire quarters? At night quarters?
31. When and how do enlisted men salute superior officers?
32. What is the duty of the non-commissioned officers toward members of the guard, especially those who have not before been at sea?
33. State some of the chief duties of the first sergeant.
34. Mention some of the duties of the non-commissioned officer on guard.
35. What are the usual special orders for sentinels at the gangway?
36. What are the special orders for the sentinel at the brig?
37. Give the most important general orders for all sentinels.
38. What books, reports, returns, rolls, etc., are kept with the guard? When are returns of property and muster rolls made?
39. Mention the accepted methods and mode of application in the restoration of the apparently drowned.

## III.—MILITARY LAW AND COURTS MARTIAL.

40. By whom may the several courts martial be appointed?
41. Give the number of members required for each court martial.
42. How do you determine the kind of court that has jurisdiction in each particular case?
43. What is necessary to be stated in the specification as to the acts committed, as to persons and as to the time and place?
44. What is a challenge, and how is a question of challenge decided?

45. What is the arraignment of a prisoner, and at what stage of the proceedings does it take place?
46. Give the various pleas which may be made.
47. What is the purpose of cross-examination, and to what is it restricted?
48. May depositions be read in evidence, and if so, under what circumstances?
49. Describe the making up of the record as to its form and substance.
50. What is the mode of procedure when the proceedings of a court are returned to it for revision?
51. Define the word "evidence."
52. State why hearsay evidence is not receivable.
53. When may evidence of character be admitted?

#### IV.—SUBMARINE MINES AND TORPEDOES.

54. Describe briefly mechanical and electrical submarine mines, with their advantages and disadvantages.
55. What are the considerations in planning a submarine defense?
56. Give a method of defending a harbor by submarine mines, and show by a sketch where the different kinds should be placed in the channel.
57. Having a depth of 40 feet of water, with soft bottom, how much gun cotton should be put in a mine resting on the bottom?
58. How far apart would you plant ground mines containing 500 pounds of gun cotton, and how far apart mines buoyed from the bottom containing the same charge?
59. Give an approximate rule for spacing gun cotton and gunpowder mines.
60. Give an approximate rule for finding the amount of the charge for any given depth, and for finding the most effective depth for any given charge.
61. What is meant by the radius of destructive effect?
62. Explain how the position of a vessel with reference to any ground mine is determined.
63. What are the component parts of a controlled mine? Give brief description of a circuit closer and its use.
64. Describe briefly the Whitehead torpedo, manner of discharging it, etc.
65. Give a brief description of the Howell torpedo, and state how it is discharged.
66. What is the great defect of the Spar torpedo? What its value under special circumstances?
67. What are the merits to be sought in an explosive for submarine mines and torpedoes?
68. Give the extreme destructive ranges of submarine explosives as determined by Gen. Abbott.
69. What kind of a fuse is necessary to explode gun cotton? Explain how it is made, with sketch.
70. Enumerate the Voltaic batteries required in submarine mine service, and name the principal electrical measuring instruments.
71. Describe the electrical tests for insulation, continuity, and resistance, with sketch.

#### V.—HASTY INTRENCHMENTS, DEFENSES, SIGNALING, ETC.

72. What are the advantages and disadvantages of shelter trenches? What is the best position for them, and what are the points to be attended to in tracing them?
73. Give a sketch of the normal shelter trench, marking all dimensions, and state at what intervals the men should be placed and how the work is accomplished.
74. Give a sketch of a trench to be used in firing kneeling, marking the dimensions.
75. Give a sketch, plan and section, of the German gun pit, and explain its construction.
76. What are the chief points to attend to in the defense of a wall? Explain with a sketch how you would prepare for defense a wall 10 feet high.
77. What considerations govern the shape, distance apart, and position of loopholes in a wall?
78. Explain how you would prepare for defense a line of wall 5 feet high.
79. Explain how a railway cutting might be utilized in the defense of a position, and say which side of the cutting you would elect to hold.
80. Give the American Morse code.
81. Explain how to signal with a flag or torch.
82. Describe the use of signal disks, or wheels, in transmitting messages.
83. What are the essentials for a good camp, and what should be avoided in selecting sites?

84. Give a method for pitching and striking tents.
85. What are the tests for the common impurities of water and methods for purification?
86. What is the best and most expeditious manner of treating, temporarily, gunshot wounds?
87. How would you apply a tourniquet?

## VI.—MINOR TACTICS AND FIELD SERVICE.

### A. Reconnoitering duties.

88. What is a reconnoitering party? What is the difference between a reconnoitering patrol, and a party employed on secret reconnaissance duty? State briefly how each proceeds to attain its object.
89. What is the difference between a reconnaissance in force, and a reconnoitering party?
90. You are ordered to take command of a reconnoitering party of one section of infantry; what precautions would you take, and in what order would you move off, supposing you were in an average inclosed country?
91. What considerations regulate the composition and strength of a scouting party?
92. In reconnoitering an enemy's position, what are the most important points to notice?
93. Describe the different methods by which intelligence concerning the enemy may be obtained, and how reports should be framed and transmitted.
94. You are directed to go forward and reconnoiter a certain length of road which the commander of a force may march by the following day. You come to a village, cross two streams (one by bridge and one by ford), and pass for a mile through a wood. In parts the country on each side is hilly. Give the points in connection with each of these features of country which you would notice in your report.

### B. Time and space.

95. Give the ordinary formations on the march (on a road) of the three arms. Show by a sketch the length of a column en route, composed of one battalion of infantry, four companies one hundred men each, in fours; one troop of cavalry, ninety-six horses; one battery of artillery, six guns without wagons. Add 20 per cent for opening out on the line of march, and calculate the time which it would take to pass a given point.
96. Give a rough practical rule for computing the space occupied by troops on the line of march.
97. A company of infantry is ordered to arrive at a bridge, distance by road on the map 3 miles 540 yards, exactly at 9 a. m. A second company is to arrive simultaneously at a further bridge, distance on the map 4 miles 350 yards; pace ordinary. When should the companies start?
98. A column of infantry in fours takes two and one-half minutes to pass across an opening under observation; pace ordinary. Calculate the strength of column.
99. A reconnoitering patrol visits a railway station and brings back the following reliable information: "Yesterday a large body of the enemy's cavalry crossed the railway. A small party in advance examined the station and cut the telegraph wires. Then came the main body. The telegraph clerk timed it crossing the bridge; three and one-half minutes were occupied in filing over; the men were four or five abreast; the horses were walking, not trotting, when they began to cross the bridge." From these data calculate the force of cavalry.

### C. Advanced guards and outposts.

100. As a general rule, what proportion should troops composing an advanced guard bear to the main body? Detail a suitable advanced guard for a division, and show by a diagram how the different arms should be distributed on the line of march.
101. Describe the various means by which the safety of an army on the march and its repose when halted are secured.
102. Describe the duties of the commander of the outposts and of the commander of a picket.
103. What distance should the main body of an army be from the main resistance line of its outposts? Give your reason.
104. What are the duties of sentries on outposts?



105. Show by a sketch the manner of posting a regiment of infantry on outpost duty, to cover the front of a division. Illustrate also a battalion of infantry (four companies) on outpost duty.
106. What is the difference between the cordon system and the patrol system of outposts? On what assumptions are these systems based, respectively?
107. What is the least amount of lateral space that should be covered by outposts; and when should outposts completely surround an army?
108. How should the advanced guard of an army corps marching through an ordinary country act on a report coming in from its scouts that a village, 1½ miles in front, is occupied by an enemy evidently with the intention of holding it? The orders given to the commander of the advanced guard were to push on if possible. Illustrate your answer.
109. How are the flanks of an advanced guard protected when moving in: (a) An ordinary country; (b) a country with continuous heights on one or the other side, and within reach of the roadway; (c) a country with heights much broken on both sides of the road?
110. What should be the composition of the outposts of a force under the following different conditions: (a) In an open country by day and by night, the enemy not being at hand; (b) in a close country when the enemy is near; (c) in a close country when a bridge or defile has to be guarded?
111. How is the posting of sentries, and how are the number and the strength of pickets affected by ground?

#### *D. Principles of attack and defense.*

112. What is the best use to make of cavalry when acting on the defensive?
113. In an attack by the three arms combined, how should the artillery act during the different phases of a successful action?
114. Why is it more necessary now than ever that in the attack on a position artillery should have an adequate force of infantry to cooperate with it?
115. Give in general terms the role of the three arms engaged in the defense of a position.
116. Under what circumstances might it become necessary for artillery to expose itself to the fire of the enemy's infantry?
117. What are the general principles on which all attacks should be based?
118. In occupying a position, under whose immediate orders should the general reserve be; and state how, and with what specific objects, it should be posted?
119. Explain why the modern system of defense requires a deeper occupation to be adopted than formerly.
120. State briefly what, in your opinion, are the requirements of a good defensive position.
121. In preparing and carrying out an attack, what special points should be regarded?
122. What are the advantages of the attack over the defense?
123. How ought the defenders to be able to reduce the assailants (assumed to be in considerably superior numbers), so as to engage them on equal terms with a fair prospect of not merely repelling their onslaught, but of assuming the offensive?
124. The general disposition of infantry for the advance to the "attack" is in three lines. Describe briefly the duties of each line.
125. In defending a position in ordinary country how many men a mile ought there to be? State generally how you would dispose of them.
126. Describe briefly what should take place when troops prepared to act on the offensive encounter a body of the enemy's troops in motion.

#### *E. Employment of infantry.*

127. When fighting with savages much superior to us in numbers, should the same formation be used for infantry as when fighting against a civilized enemy? Describe in general terms what formation you would recommend, giving your reasons.
128. At what ranges, in your opinion, may infantry fire be used in the attack on an intrenched position?
129. Under what circumstances may long-range fire be adopted, and what precautions are necessary to obtain the greatest effect from it?
130. What are the advantages of the open order of modern fighting? What precautions are necessary to be observed in its use?
131. In an attack on an intrenched position, what, in your opinion, is the proportion that the combatants should bear to one another, supposing both forces to be about equal in morale?
132. Describe briefly the principles of infantry tactics in defense.
133. Describe the several stages of action of infantry in the attack of a position.

*F. Employment of cavalry.*

134. Two squadrons of cavalry are ordered to attack a battery of artillery which has a cavalry escort. How should the commander of the squadrons make his attack?
135. Why should cavalry never attack without a reserve?
136. Show, by a diagram, the attack formation of a cavalry brigade of twelve squadrons; state distances of supports and reserves from first line.
137. What points are essential, and what desirable, to insure success in a charge of cavalry against infantry?

*G. Rear guards and marches.*

138. You are in command of a rear guard covering the retreat of a defeated army. You find, after some time, that the pursuit of the enemy is slackening; later on you have reason to believe the pursuit has ceased altogether. How would you act in each case?
139. An army is compelled to make a flank march. Three parallel roads are available; the enemy are within striking distance on the right flank. Describe the dispositions you would make for the march of the columns and any other precautions you would take.
140. How is it that the rear guard, which is far weaker than the main body, has power to delay the advance of a victorious enemy? Upon what does this power depend?
141. To what points should the attention of officers be directed in connection with the maintenance of efficiency in the troops during a march?
142. What is a flank march, and on what does its success depend? When is it a dangerous undertaking?
143. In selecting a rear guard position, what points should be particularly attended to by a commander?
144. Suppose a division to be moving along a road and the enemy is known to be at hand, in what order would the several arms, ammunition, baggage carts, etc., march? What difference would be made in the order of march if the enemy were distant?
145. What must determine the composition and strength of a rear guard, and from what troops should it be selected if possible?
146. Why should a rear guard, as a general rule, not make counter attacks, and under what special circumstances may the commander of a rear guard consider it advisable to make one?
147. How, and in what order, should a small rear guard of all arms fall back before a superior force in an open country?
148. What is the object of "timed" marches?
149. In a march of a force of all arms what precautions are necessary to reduce fatigue to the utmost?

*H. Rivers and defiles.*

150. What are the limits of depth passable in a ford for the three arms? Which would you rather attempt to force, a bridge or a ford?
151. What is the most advantageous position for the defense of a bridge?
  - (a) Supposing no cover to exist on the enemy's side?
  - (b) Supposing cover to exist on both sides?
  - (c) Supposing cover to exist on the enemy's side only.
152. What are the three different positions from which a defile may be defended? Which is usually the best and strongest position to take up?
153. Under what circumstances may it be best not to oppose the passage of an enemy across a river? And when the defenders make up their minds to do this, what is the proper course to adopt to check the enemy?
154. Define a defile in the military sense of the word. State broadly features of defiles?
155. When an obstacle with passages over it (such as a tiding, etc.) is found running parallel and tolerably close, how should such an obstacle be guarded? Show how you would place pickets and supports.
156. An army is obliged to retire through a mountain pass and an enemy is in pursuit. State in general terms the principles which should be conducted.

157. Why should a commander before attempting to throw a bridge over a river look out for—  
 (a) Cover on the enemy's side?  
 (b) A bend of the river toward him?  
 (c) A tributary stream?
158. Are rivers considered formidable barriers or not? State reasons. When is a river line most favorable for the defenders, supposing them to have decided not to oppose the actual passage?
159. Explain the terms passive and active defense as applied to rivers.
160. The locality fixed, what tactical considerations should determine the point of crossing a river, supposing the river itself, as regards depth and width, to be about the same for some distance?
161. What are the circumstances which materially assist a defender to concentrate his forces with sufficient rapidity to dispute the passage of a river?
162. Why is a rallying point on the opposite bank when crossing a river of such extreme importance, and why should principal and secondary crossings be combined?
163. What rôle is played by the artillery of an army in—  
 (a) Crossing a river in the presence of an enemy?  
 (b) Opposing an attempt to cross?
164. How should a force of all arms pass a defile in the presence of an enemy?

#### I. Villages and woods.

165. Describe the general arrangements you would make for the defense of a wood with regard to—  
 (a) The disposition of the men under your command (artillery and infantry).  
 (b) The construction of obstacles.
166. What difference would you make in putting a village into a state for defense—  
 (a) To hold it to the last?  
 (b) To retard an enemy?  
 What is of primary importance in both instances?
167. What are, in your opinion, four of the principal considerations which influence the defense of a village?
168. State generally how the attack of a village should be conducted. Say why it should be avoided if possible.
169. What are the points to be noted before occupying a wood? Where is the heart of the defense situated?
170. How long is a wood of advantage to the defenders? What are the weakest points in defending it, and how should they be protected?
171. What is the disadvantage of wood-fighting common to both sides?

#### J. Convoys.

172. What general rule regulates the strength of a convoy, and what is the rule as to the order of march of the wagons?
173. How should the escort be distributed, supposing it to be composed of infantry and cavalry? What troops should furnish the advanced guard, and why is reconnoitering so essential?
174. What is the rule as to halts—(a) temporary halts; (b) halting for the night; (c) when the convoy is of gunpowder?
175. What are the most vulnerable parts of a convoy, and what dispositions should be made to protect them?
176. Describe how you would get through a defile with a convoy, supposing the enemy to be in the vicinity?
177. How is a convoy of boats conducted?
178. What positions would you select for the attack of a convoy, and what is the best combination of troops for the purpose in an average open country?

#### K. Night attacks.

179. State what the advantages and disadvantages of a night attack are.
180. When is a night attack admissible?
181. State some of the principal precautions to be observed in undertaking operations at night.
182. Give the formation of a column consisting of a brigade of infantry, one regiment of cavalry, one battery of artillery, and a company of engineers during the march to a night attack.

183. What is the rôle played by the assailant's artillery and cavalry during night operations?
184. How should the defender's outposts act on the approach of attacking column at night?
185. Supposing a night attack to be successful, what troops should pursue until day-break?

## VII.—STRATEGY AND TACTICS.

186. What must be the character of the roads for the operations of large armies, and why do armies generally operate by several roads defensively and on the offensive, with examples?
187. What power does the offensive give, and what is the initiative?
188. What are some of the considerations for a selection of a theater of operations?
189. What is the general object of strategy and what are the kinds of advantage to be obtained by strategy?
190. What are the particular objects of strategical movements?
191. What are the alternatives of an army cut from its base?
192. What are the comparative advantages of partial and complete interception, with examples?
193. What are the deductions from the different ways in which a containing force may be employed, with examples?
194. What are the general deductions from operations interposing an army between the parts of an extended front?
195. What are the campaigns of 1861 and 1862 in Virginia given to illustrate?
196. Compare the advantages of turning the flank or breaking the front of an army.
197. What are the general conclusions from the discussion of mountains and rivers, as traversing obstacles?
198. What are the deductions from the battle of Prague?
199. What is the aim in modern battles, and what formation is recommended for attack?
200. What was the Prussian order for attack in 1870?
201. What should a line of battle be?
202. What are the comments on the battle of Woerth?
203. What three kinds of tactical advantages are set forth?
204. What are orders of battle defined to be, and when is the order well chosen?
205. What form did the line of the allies assume at Waterloo, and what is said of it?
206. What would influence in the selection of points of attack?
207. What renders a defeat decisive?
208. In attacking a position, what is to be done with advanced posts, and what is said of strong points in the line, with examples?
209. What should be the point of attack when a flank of the enemy rests on an impassable obstacle?
210. How should the ground be occupied on the defensive when a flank is covered by an obstacle?
211. In taking up a defensive line, or attacked while maneuvering, what conditions should the general seek to obtain?
212. What should be the conduct of an attack?
213. What was the Prussian final formation for attack in 1870, and why did this increase the effect of the aggregate amount of fire?
214. Considering the changes in contemporary tactics, what should be the disposition of first, second, and third lines, and general reserves on the defensive?



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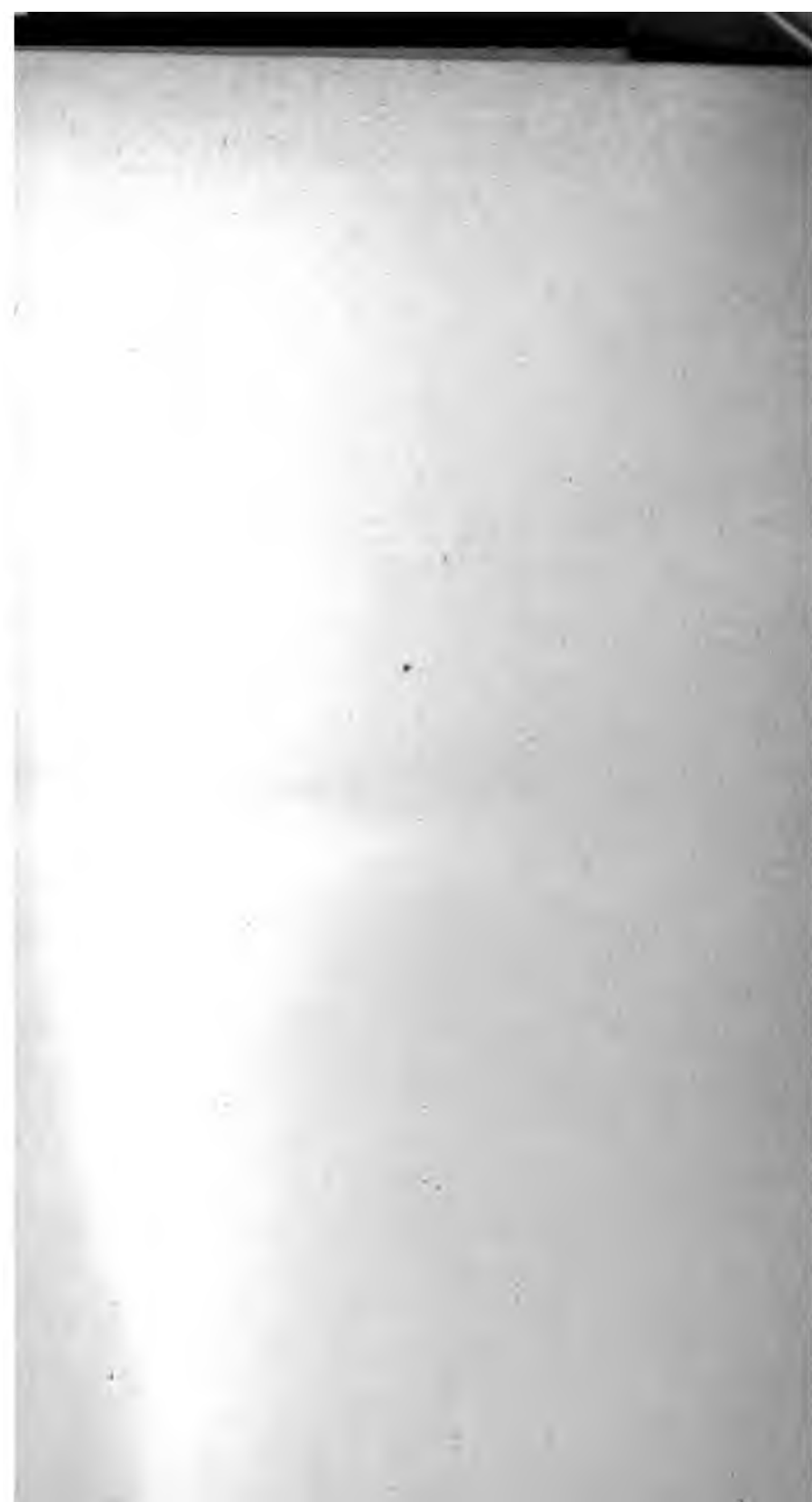
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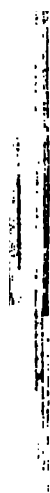
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1. The first part of the document is a list of names and dates, which appears to be a record of some kind. The names are written in a cursive script, and the dates are in a more formal, printed style. The list is organized into two columns, with names on the left and dates on the right. The names are: John Smith, James Brown, William Jones, and Thomas White. The dates are: 1810, 1811, 1812, and 1813. The list is followed by a signature, which appears to be "John Smith".

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